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• *Above view shows 12-inch Nicholson Mill Bastard used to remove heavy burr raised in drilling set-screw hole for locking booster in shell. Also used on cut-off operations (see right).*

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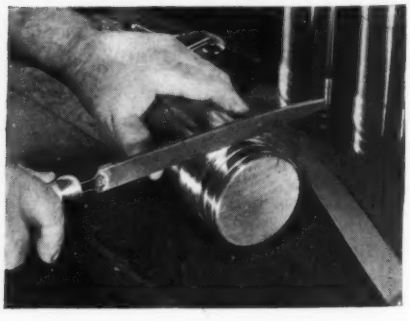

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

VOL. 30 NOVEMBER, 1941 Number 9

THE A.V.A. COMES TO NEW ENGLAND

Boston is ready for the first American Vocational Association convention to be held in New England.

On December 10 to 13, 1941, delegates from 48 states and thousands of trade, industrial-arts, home-economics, agricultural, and distributive occupations, together with hundreds of teachers from the vocational school of the nation will convene in this well-known historical city.

Philip J. Spang, president of the Massachusetts Vocational Association, is convention chairman; L. R. Humpherys, Utah State Agricultural College, and L. H. Dennis, Washington, D. C., are president and executive secretary of the national body.

Defense training programs will prove to be an added attraction to visitors and provide topics for many of the nationally known speakers who are scheduled to appear. Consideration of the adjustments necessary at the end of the emergency will be the theme of other leaders.

In addition to the main convention session, which will meet at the Hotel Statler in historic Park Square, there will be many parallel national meetings including the National Association of Directors of Vocational Education.

New England teachers are planning a comprehensive exhibit of their work and have arranged for tours of inspection to their schools and to places of historic interest.

Every teacher of industrial arts and vocational education should plan to attend.

THIS MONTH'S COVER

The picture chosen for the cover of the November issue depicts a Dodge army truck churning through a heavy mud wallow. Truck driving under difficulties is one phase of the training given to the U. S. Army officers attending the Chrysler Corporation school for motor transport men.

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Short Talks on Wood

EASTERN HEMLOCK (*Tsuga canadensis*)

An important forest tree, sometimes known as hemlock spruce or spruce pine. Wood is light, moderately soft and coarse-grained. Has a tendency to splinter and is subject to ring shake. Holds nails well. Nonresinous. Not very durable. Pale buff in color.

Formerly this tree was cut primarily for its bark which is rich in tannin and useful to the tanning industry. In more recent years its wood was found to be valuable for framing, sheathing, roofing and subflooring if carefully manufactured and graded. Also used for boxes, crates, slack cooperage and paper pulp.

Grows principally in the Lake States and in the mountains of the eastern part of the United States. Prefers moist, cool, shady locations. Usually found on rocky ridges, in gorges and on the northern slopes of mountains. Very tolerant of shade.

Generally attains a height of 50 to 80 feet and a diameter of 1 to 3 feet. In the open it is a beautiful, pyramidal tree with branches that are horizontal or slightly pendulous at the base and ascending near the top. Possesses considerable value as an ornamental.

The bark on mature trees is cinnamon-red or dark gray and is divided into narrow, rounded ridges. The needles are from ⅛ to ⅜ inches long, oblong, dark green and lustrous above, and whitish beneath. Spirally arranged although sprig appears flat. Cones are about ¾ inch long, oblong, light brown and are suspended on slender stalks. Seed is small and winged.

To date, twenty-nine brief articles similar to the one above and dealing with the more commonly used woods have appeared in these ads. As in the past, we continue to invite your suggestions as to the species of wood you would like featured in this series.

YATES-AMERICAN

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

Industrial Arts in a System of Public Education

HEBER A. SOTZIN*

Introduction

Every great nation and historical era has made a definite contribution to civilization. The Greeks gave us art, philosophy, and literature; the Romans law, order, and government; and the Jews Christianity, morality, and justice. The dominant element in American life is the rapid rise of invention and its application to industry. Industrial expansion and development have produced "The Machine Age." Technological advancement and the machine are determining factors in the current social order. To comprehend and interpret contemporary civilization and its disconcerting problems, industry, the machine, modern technology, and its resultant effects upon society must be studied and understood. Consequently, a major concern of the public school today is to provide an educational program and curriculum for a social order which is basically industrial. This article, therefore, is concerned with industrial arts and the possibilities it possesses as a contributory element in realizing the aims of general education.

Terminology

In view of the confusion relative to the terminology associated with the manipulative activities in our schools, a definition at this point will be appropriate.

Industrial arts is that part of general education concerned with satisfying man's innate desire to construct with concrete materials, and the development of an intelligent understanding of our modern industrial civilization and the problems which have resulted from it through contacts and experiences with a wide variety of industrial materials, processes, and tools of manufacture.

Industrial arts is distinguished from vocational education in that the latter is specific occupational training, i.e., training for a specific occupation with the purpose of earning a livelihood; while industrial arts is an integral part of the general educational program which is not concerned with earning a living. It is true that the same tools, materials, and processes may be employed in both fields; the aims, techniques, and procedures, however, are entirely different and should be distinguished as such. The term industrial arts has been in use for approximately 35 years and is rapidly displacing the original term of manual training. The new term has a broader connotation and is more inclusive in its relations to modern progressive education.

Social and Economic Changes

Until recently the majority of our population lived in rural sections and resided on farms. From an economic standpoint these people were largely self-sufficient. Furthermore, children participated in the raising and preserving of foodstuffs and crops; in constructions of various types; and in the multiplicity of activities and chores associated with farming. Children were an economic asset. Today they are an economic liability. Children today do not have the opportunity to acquire the experiences of the world's workers nor to observe people at work. Their experiences are largely vicarious. Gainful occupations were once relatively few. Today there are more than thirty thousand, with probably more than a fourth of the population engaged in occupations which did not exist a generation ago. Where once each village had its miller, blacksmith, wheelwright, and cooper, whose work children could observe, today child experience is confined largely to the finished industrial product put out by mass-production methods. The family has lost its self-sufficiency and the children, as well as adults, have grown increasingly more dependent. Children possess scant knowledge of the fabrication, construction, evolution, experimentation, and labor which has gone into the manufacture of the hundreds of articles in daily use. They are certainly not to blame for this lack of knowledge nor is anyone else to be censured too severely. It is part of our evolution and the system under which we operate. Simple construction, a few skilled artisans, and small employers have been displaced by industries which have a complicated organization and thousands of employees. Where once the boy or girl could observe the village blacksmith at his forge and anvil and acquire first-hand knowledge, today he sees huge manufacturing plans covering acres of ground and single machines four stories in height. The buildings are often surrounded by high walls, board fences, or wire fences topped with strands of barbed wire and signs which read, "Keep Out" and "No Admittance." These walls could be scaled only by an expert pole vaulter, and if anyone possessed either the ability or agility to scale them he would probably be arrested for trespassing upon private property. A paradox is the result; as race experience and race history indicate that the numerous practical activities in which children once participated and which are no longer furnished by the home, are valuable assets in the social and economic development of the individual. If these activities are an essential part of desirable individual growth and personality, it follows that some social agency must furnish them. As the school is the only social agency to reach everyone, it follows that the school must assume the responsibility and afford adequate facilities and opportunities to acquire these valuable assets.

It should be obvious to everyone, and particularly to teachers, that this is an age of social and economic change and confusion. Whether we are drifting toward a totalitarianism or collectivism, a new and better type of democracy, or reverting to a new barbarism remains to be seen. The current age is characterized by:

*Professor of Industrial Arts and director of the Division of Industrial Education, San Jose State College, San Jose, Calif.

1. Startling changes in our national economy.
2. The rapid development of scientific discovery and its application to invention and industry.
3. The development of mass-production methods and the inability to dispose of goods or distribute them cheaply.
4. The increasing dependence and interdependence of people accompanied by an apparent helplessness of people and nations.
5. The discarding of old principles and traditions for what are frequently new and untried theories.
6. The decreasing birth rate.

Evidence of social and economic unrest and confusion is all about us as is indicated by (1) millions of idle workers and idle capital; starvation in the midst of plenty, extremes of poverty and wealth, with the large middle-class group caught between the two millstones — the poverty stricken and ultra rich; (2) undeclared and declared wars; and the expenditures of billions for the most reprehensible invention of mankind, namely, war. These major problems are accompanied by (1) social and moral disintegration, (2) rise of demagogues with fantastic notions and theories, (3) increase of mental, cardiac, and social diseases, and (4) educational confusion.

In this dilemma it is interesting to note how teachers react to the existing conditions. There are those (1) who are unaware of what is taking place, (2) those who are cognizant of what is taking place but take a defeatist or *laissez faire* attitude, (3) those who understand the situation but decline to do anything lest they jeopardize their position — a timidity which is understandable in view of the vulnerability of the profession, (4) those who attempt to correct the situation by making speeches, recommendations, and passing resolutions at their professional meetings which are adopted and promptly tabled or pigeonholed, and (5) those who join militant and radical groups, who demand action and change. These last mentioned usually become notorious or lose their positions or both.

Despite the fact that teachers are better selected, trained, and educated today than in any previous period in our history, the majority are confused about the function of education. Teachers need a basic educational philosophy to give them guidance and direction. But unless our educational philosophy can be translated into activities and into realities which in turn will produce a better, a more intelligent, a more tolerant, a more cooperative, and a more understanding society, its efficacy is to be questioned. The attitude of many industrial-arts teachers is that these social problems are no concern of theirs.

On the other hand, an industrial-arts teacher from the East writes:

> . . . I believe we have been isolationists in the school all too long. We talk of our "special subject" as if it were a thing entirely apart. We have been too much on the defensive. We picture the so-called "academics" almost as though they were an opposing army. We have damned the academics as being rank theorists and patted ourselves on the backs for being "practical shopmen" instead of seeking the broad avenues which lead from and to our subject into theirs. We have made our program revolve around skills instead of placing uppermost the development of the whole individual.

In discussing the opportunities and responsibilities of industrial-arts teachers, Dr. Edwin A. Lee, while superintendent of the San Francisco public schools, made a significant statement when he said:

> No member of the teaching staff of the secondary school has a greater opportunity to influence our youth than has the industrial-arts teacher. He only is to blame if he *muffs* the opportunity, either because he is inactive or indolent. The industrial-arts teacher is challenged to keep abreast of technology, economics, sociology, government and politics, and current trends as is no other teacher. He should be better read in these fields than any of his colleagues. He should speak with more authority concerning their implications as they relate to youth than any other member of the secondary staff. To do this means ceaseless study and continuous investigation. Like *Alice in Wonderland* he, more than any other teacher, must run so as to stay where he is; for in the fields of knowledge and activity represented by the subject he teaches will be found most profound and significant changes, changes which in their impact upon society bid fair to change a civilization.

Education in a Democratic Society

The definitions pertaining to education are numerous and varied. The majority of them, however, refer to education as "change," "growth," "continuous growth," "individual development," "growth conditioned by environment and training," etc. John Dewey, probably America's foremost educational philosopher, defines education as:[1]

> That reconstruction or reorganization of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent experience.

This definition implies that education is continuous growth. Its aims and objectives should be determined by the current socioeconomic order, the environment and nature of individuals. Our schools should typify existing life situations and conditions if they intend to educate and develop useful and intelligent citizens.

The modern educational program no longer deals with docile children who are regimented, sit quietly, memorize, recite, and conform to rigid discipline. The belief was once held that mental discipline was the keynote for producing useful citizens. This idea has been displaced by one which believes that mental and physical growth accompanied by tolerant understanding and social cooperation will produce useful citizens and improve society. In the modern type of school, children participate "by doing" under teacher guidance and direction. Obedience is acquired by sharing, cooperating, and participating in purposeful social activities. Children are taught to plan, to solve, to create, to execute, to criticize, and evaluate.

The new concept of education is well expressed by Bode when he says:[2]

> This reconstruction of experience, if it is to have any significance, must take the form of actual living and doing. Consequently, the school must be transformed into a place where pupils go, not primarily to acquire knowledge, but to carry on a way of life. That is, the school is to be regarded as, first of all, an ideal community in which pupils get practice in cooperation, in self-government, and in the application of intelligence to difficulties or problems as they may arise. In such a community there is no antecedent compartmentalization of values. Shopwork, for example, is not dominated by the idea of personal profit, but becomes a medium for the expression of esthetic values and social aims.

Modern progressive schools are child-centered schools. To accept this new educational philosophy is difficult for many teachers. Teachers who have followed a standardized course, repeated "pet projects" for years, are not likely to make sudden changes. Neither should they, until they themselves are thoroughly convinced that the new is superior to the old. On the contrary, there are many teachers who have accepted a modern educational philosophy, but are denied the privilege of putting it in practice because of state and local regulations or because of objections by administrators and superiors.

Let us now see how this new philosophy affects the industrial-arts activities in the program of general education.

Development and Evolution of the Practical Arts

Since manual training was first introduced into this country it has passed through five rather definite periods. These may be characterized as:

1. The *exercise period* in which abstract exercises were made for their disciplinary values.
2. The *sloyd period* in which useful articles were made that appealed to the pupil's interests without much regard for design and beauty.
3. The *arts and crafts period* in which design and artistic expression were stressed rather than tool manipulation.
4. The *industrial period* in which an attempt was made to provide occupational training in the general educational program.
5. The *industrial-arts period* in which a sharp line of demarcation has been drawn between manual activities for general educational purposes and those for specific occupational training.

The latter has given rise to the development of the "General Shop" and more re-

[1] Dewey, John, *Democracy and Education*, pp. 89–90, Macmillan Co., 1926.

[2] Bode, Boyd H., *The Educational Frontier*, p. 19, Appleton Co., 1933.

cently to "The Laboratory of Industries" which has been introduced by Dr. William E. Warner, of Ohio State University.

With the development of a better philosophy, improved training and selection of teachers, experimentation and research, all of which are correspondingly new, there has arisen a body of thought relative to the content of industrial arts which has been described as:[3]

. . . a study of changes in the forms of materials and of the social problems related to these changes. It is a means of developing social intelligence and appreciation through understanding the aspects of the environment which has resulted from man's transformation of raw materials to finished products. It is a study of the industries in relation to the interpretation and pursuit of daily life.

The educative content, materials, and activities of industrial-arts teaching grow out of the study of the various purposes of industrial materials, namely those used for food, clothing, shelter and furnishings, utensils, tools and machines, and the methods of printing, publishing, and transmitting experiences, often collectively called records.

Work with tools and materials is for the sake of clarifying ideas and cultivating attitudes and appreciations of values related to the use, distribution, and production of industrial supplies. These values are realized through the development of habits, knowledge, attitudes and appreciations relating to health, economy, art, and social life. Every industrial-arts activity included should justify itself by its contribution to one or more of these values.

To secure these values requires far more than mere handwork or construction activities in connection with the study of geography or history. It means a well-organized body of thought, giving insight into industrial materials, industrial methods, and the social aspects of industry. It requires direct and intimate contacts with the materials, processes, and products of industry, and with the methods of organized production, distribution and sale of industrial commodities. Construction activities, observations, investigations, experiments, excursions, and readings all have their part in the development of industrial intelligence, insight, and other practical behavior controls relating to the selection and use of materials and products.

In the elementary school, skill as an end in itself is subordinated to meaning, insight, and appreciations but is sufficiently emphasized as the work progresses through the grades to develop the idea of good workmanship, accuracy and efficiency.

The largest problems are those of developing an appreciative understanding of industry as it is at the present time, realizing its social problems and cultivating intelligent judgment in the selection and use of industrial products. The social values of industrial arts are of fundamental worth in developing social habits, social attitudes, and an understanding of the basic needs and values of individual, community, and national cooperation.

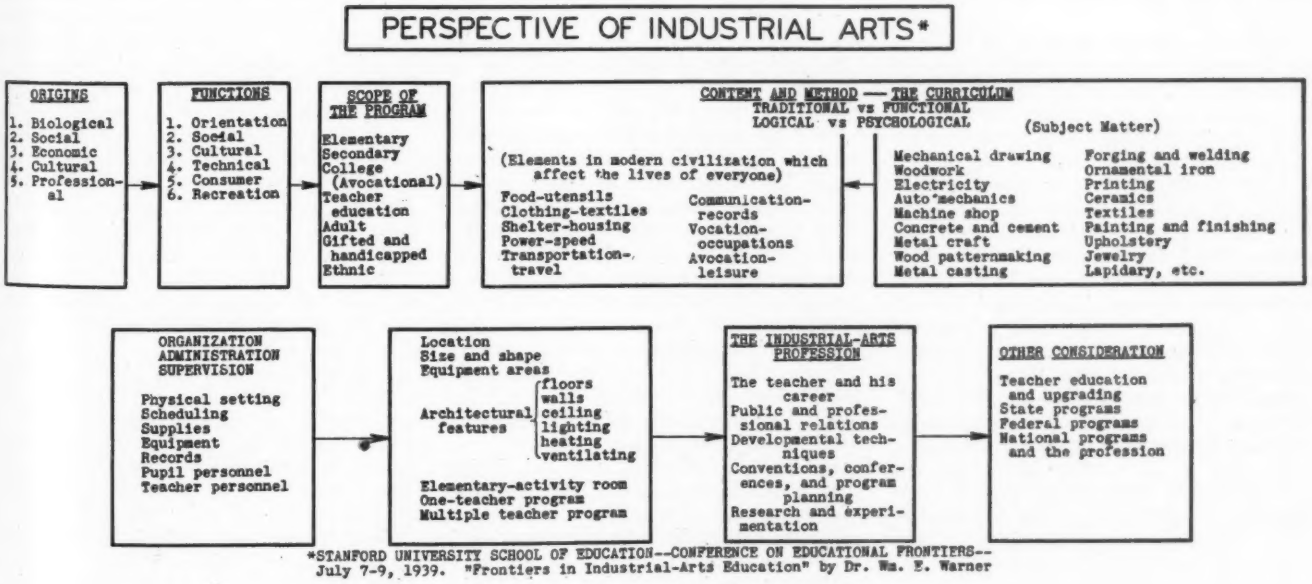
Industrial arts properly taught develops intelligence in the selection and use of the products of industry; stimulates interest in and an understanding of science and mechanics as applied to industrial processes; develops usable skills which function in any situation requiring the exercise of accurate motor co-ordinations; gives children a proper attitude toward and an appreciation of the work of the world; stimulates interest in art and develops an appreciation for the beautiful in the products of industry; permits children to give expression to their natural impulses to create, to investigate, to construct; fosters and directs the development of the creative impulses; affords objective means of organizing thoughts and solving problems; develops social habits of cooperation, orderliness, and neatness; uncovers or reveals the need for much of the subject matter constituting the proper content of other subject fields; stimulates and encourages initiative, inventiveness, and originality; preserves the fundamental skills of handcraft; encourages the proper use of leisure time; develops a real understanding of the interdependence of peoples and nations; and demonstrates the necessity of man's adaptability to changing civilization and his constant endeavor to improve his living conditions.

These statements indicate an industrial-arts program which differs radically from the older program, in which the approach was primarily vocational and from which we still suffer too much today. The older program stressed skills and projects. The new considers skill in a relative sense and stresses the larger and wider social implications inherent in these activities. If the primary concern of education is to train people to live efficiently and effectively in an industrial society through an understanding of that society, then the problem is to organize subject content of a functional type, which can be justified in desirable social attainments through experiences which are conducive to the progress of society.

To adhere rigidly to the old standardized disciplinary type of shop experiences with emphasis on production and skills, brings derision and an excess of towel rollers, letter holders, footstools, magazine stands, and taborets. On the contrary, to discard the outmoded for the new without being in accord with it or familiar with its basic tenents will result in confusion, antagonism, and a denouncement of the entire program. Industrial arts, like every subject, to be worth while and effective must produce interesting and satisfying experiences.

Since manual training was first begun the ultimate aim of the majority of teachers has been the finished individual project. In many instances the project was not a means to an end but an end in itself. With an improved philosophy, both in general education and industrial arts, it is becoming apparent that the individual project will be greatly minimized in the future. Activities for both girls and boys

[3]Tentative Course of Study for Virginia Elementary Schools, Grades I–VII, 1934, pp. 368–369.



*STANFORD UNIVERSITY SCHOOL OF EDUCATION--CONFERENCE ON EDUCATIONAL FRONTIERS--July 7-9, 1939. "Frontiers in Industrial-Arts Education" by Dr. Wm. E. Warner

Diagram showing the derivation and expression of a philosophy

will be centered around such major problems as:

1. Health and safety;
2. Food and utensils;
3. Clothing and textiles;
4. Shelter and housing;
5. Power and speed;
6. Transportation and travel;
7. Communication and records;
8. Vocation and occupations;
9. Avocation and leisure;
10. Democracy and democratic living.

These are problems which confront and affect everyone, regardless of present or future social, economic, or occupational status. They will serve as a portion of man's social training and should afford a broader knowledge and experience relative to current existing social and economic conditions. Shop and laboratory experiences will continue to be offered, but largely through group or committee participation. Manipulative experiences will be supplemented by visual aids, readings, observations, field trips, investigations, reports, and evaluations. It is expected that out of these activities and experiences there will accrue a body of knowledge and information; and a desire on the part of the participants to correct many of the ills from which society suffers at present, and at the same time develop a desire to engage actively in building a better civilization.

Conclusion

In summary it may be said that:

1. The chief problem of the schools today is to provide a program of education for a social order that is primarily industrial.
2. Industrial arts as an integral part of general education is growing increasingly more important in its potentialities to make worth-while contributions to the educational program through an appreciation and understanding of the processes and practices of industry.
3. Industrial arts continues to employ the vocational and skilled method of approach. Slowly and gradually the functional type of approach is being adopted through the establishment of "exemplary programs" and laboratories rather than highly specialized shops.
4. The newer program of industrial arts requires a different type of physical setting than the old, as it contains a wider range of activities and media in which to offer manipulative experiences.
5. The industrial-arts teacher of the future will be an individual who is selected with greater care than formerly. His training program will be longer than the present one. He will be broadly trained in the arts and sciences before beginning his professional studies. In other words, he will be educated before he is professionalized. His undergraduate professional program should provide a broad progressive educational philosophy accompanied by thorough training in a wide variety of basic manipulative skills. The latter is essential for the comprehensive nature of the program he will be obliged to teach.
6. Lastly, the industrial-arts program which heretofore has been given largely on the secondary school level will find its rightful place on all levels of education — the elementary school, the junior and senior high schools, the colleges and universities.

The Relationship Between Industrial Arts and Vocational Education

T. A. HIPPAKA*

Surely these are days when we should relate all educational enterprises one to the other. We should think in terms of vital relationships in order to add purposefulness and continuity to every educational program. Articulation, and not duplication which often results from unsound rivalry and competition, should be our sole aim.

While the primary purpose of this paper is to discuss the relationship between industrial arts and vocational education, let us first look at education in general, especially in the light of the present crisis.

No enterprise in the life of any nation is more important than its schools, for it is the educational system of a country that has most to do with its culture, its progress, and humanitarian motives. The schools of any nation ultimately determine the physical vigor and the moral fiber of its people. For centuries nations have enlisted their schools in their various national enterprises during times of peace as well as during times of war. Today it happens to be war. While the totalitarian nations no longer respect the rights of the individual, we in America insist that the individual and his welfare come first. At least 200,000,000 people live in countries where this philosophy still exists.

*Professor of Industrial Education, Iowa State College, Ames, Iowa.

In America we hold that no two persons are alike, and yet all of the God-given aptitudes of all of the people should be developed so that they may become intelligent and responsible citizens of a democracy. Our schools aim to conserve and to enrich the natural eagerness, originality, spontaneity, constructiveness, and curiosity of youth. We insist that most work worthy of the name does require effort and presents obstacles that must be overcome. Equal opportunity for every child according to his capacity is our aim.

No youth wants to be a failure, nor will he be a failure if we sufficiently understand his limitations as well as his strengths and individualize his program to show him off to advantage; and if we play on the keyboard of his life long enough and intelligently enough, we will strike a responsive chord. Thus we believe in enriching spiritual life, strengthening civic loyalties, developing human resources, perpetuating individual liberties through the shouldering of responsibilities, building health and character, and fostering social and economic security.

Particularly during national crises schools are always called upon to carry added burdens, often with reduced appropriations and staffs. The present crisis is no exception.

While there is much that is right with our schools, we need to be reminded that the educational services now provided for a considerable percentage of America's children are far below what they should be, and that unless additional funds are forthcoming, several million of our children will be denied educational opportunities which are their birthright.

More than ever before we are conscious of the fact that high attainment in health, morale, morals, knowledge, skills including the mechanical, and physical fitness are essential in a democracy if we are to adequately cope with national as well as world issues. Democracies have awakened to the realization that a nation needs mechanics and craftsmen as well as white-collar workers, and that all honest labor is honorable. Industrial arts and vocational education are being stepped up in the face of a serious shortage of industrial-arts and vocational teachers. We realize that we cannot be a great nation by producing less and less.

The workaday world is placing a high premium upon personality traits. Employers everywhere, whether they are in the professions or industry, are saying "Give us men and we will teach them the tricks." They want people with a reasonable amount of general education and, if possible, those who are basically grounded in some one line of endeavor. Above all, they want youth who are honest, dependable, thorough, and willing to learn and to re-

tain on the job. Industrial arts makes a valuable contribution here when it insists that every student should work to capacity, do the very best that he can, and complete in every detail purposeful tasks that have been carefully planned. Neatness, accuracy, and a workmanlike approach to the solution of every problem constitute personality traits highly valued in the world of work.

Industrial arts in our public schools should be made available for everyone. Too often it is prescribed only for those who are having serious difficulty with an academic program. If we are to develop all of the aptitudes of all of our people, industrial arts should be for all. A well-rounded-out individual uses his hands as well as his mind and enjoys the satisfaction that comes only when the hand and the mind are working together. Particularly in times of stress and strain he is able to make the fingertips a natural outlet for his emotions because he has been permitted to learn to use his hands. He has acquired some handy-man ability which will serve him in good stead even though he does not become a tradesman later.

At least 80 per cent of us earn our living with our hands. It is through industrial arts that we become acquainted with the world of industry and the problems of the worker as well as the employer. Surely there would be less turmoil in the world of work if all of us possessed more understanding of, and tolerance for, the other fellow.

The importance of industrial arts in the lower elementary grades should not be minimized. The child is primarily a creator and a learner. He naturally wants to use his hands as well as his brain. The child, through industrial-arts activities, is endeavoring to gain personal satisfaction and, to a certain extent, to obtain group recognition, approval, and admiration. He works in various mediums including clay, wood, paper, raffia, soap, cloth, and yarn; and what happens to him when so doing is often more significant than the ultimate and more tangible product, important as that may be.

A variety of activities is generally provided in a good junior high school industrial-arts program, the purpose of which is self-finding, tryout, exploration, and experimentation. Courses or units should not be made so short and so numerous that the boy starts a number of projects but does not complete any of them. Real satisfaction comes from a job well done. Here again the boy is developing personality traits through well-planned, purposeful industrial-arts activity.

In the senior high school the boy is permitted to pursue shop activities of his own choosing, the purpose of which is still general education in most instances. In exceptional cases there may be a trade emphasis. Guidance-minded teachers are helping the student to find himself, to develop reasonable shop skills, and to further acquaint him with the world of work in order that he might better select his life-work. Upon the basis of his school experiences, and possibly some work experience, he then attempts to decide whether he will enter a profession, business, or trade. If he decides to enter a trade, trade education is his next concern.

Through industrial arts the boy has acquired some general background, certain appreciations for the trades and the world of industry, and various personality traits which will prove an asset to him. No doubt he has developed certain skills that will stand him in good stead.

Trade education is more exacting from the standpoint of developing skills and mastering technical knowledge. The boy is now preparing himself for a specific trade where he must face competition and where speed and accuracy are at a premium. Alibis and excuses have no place in this picture where the worker's worth is measured by his ability to produce. Today, youth is not only preparing for industry, but he is preparing to defend his country at a time when wars are won in factories and when adequate national defense means skilled tradesmen as well as armed forces.

Thus we see that there is a definite relationship between industrial arts and trade education, and that one in no way undermines the importance of the other. Particularly during times like these, teachers and administrators of industrial arts and vocational education as well as other types of education should be most tolerant of each other's points of view. If there ever was a time when it was a patriotic duty to articulate and to otherwise improve all educational effort in order to meet the needs of youth and our country, that time is right now.

Counseling Procedures of Industrial-Arts Teachers

LOUIS V. NEWKIRK*

A recent analysis of some 100,000 job applications and 45,000 placements of high school graduates in the Chicago area indicates that the possibilities of getting work in the service fields rank highest, the production and technical fields next, followed by the sales field, with the *white-collar* clerical jobs ranking last in opportunity.

Since the possibilities for employment of technically trained boys is high, it is apparent that industrial-arts teachers have a considerable obligation to help in the guidance of boys who are considering a technical or trade career.

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Industrial-arts teachers can and should make a great contribution to the vocational and educational counseling of youth in the American public schools. Industrial arts is commonly understood to be a study of modern industry with the various related social and economic problems which affect industry or are a result of it. Industrial arts is also a learning area where boys and girls learn by working with tools and materials as the major driving force. The modern industrial-arts course is commonly taught in laboratories where boys and girls have an opportunity to experiment and do creative work as well as to shape materials into projects.

The major objectives of industrial-arts education have many implications for guidance and counseling.

After a considerable period of study and experimentation American educators have come to accept the following objectives as embracing the fundamental philosophy of industrial-arts education as a part of general education for boys and girls. These objectives have many clear implications of the need for counseling procedures on the part of industrial-arts education teachers.

1. *Interpret the modern industrial and trade world to boys and girls.* Today industry is so extensive and varied that boys and girls need an opportunity to study the types of industries and to learn what voca-

tional possibilities can be reasonably expected if they decide to enter the industrial field. This objective is particularly important in Chicago because of the number and varied types of industries that are available.

2. *Provide handwork experiences with a variety of tools and construction materials typical of modern trade and industrial life.* Industrial-arts education provides the boys and girls with an opportunity to work with the common construction materials, such as metal, wood, paper, glass, plastics, textiles, leather, and clay. These materials are worked with hand tools and small machines. They are used in a variety of projects and experiments to develop elementary skill and to objectify and illustrate important industrial processes.

3. *Provide opportunities for developing desirable personality and social traits.* Industrial-arts education offers unusual opportunities for developing desirable social traits. The pupil may work as an individual, as a member of a small group, or as a member of the large group. He has opportunities to develop leadership and to work as one of the group.

4. *Provide craft experiences for leisure-time interests and promote the development of the home workshop.* Industrial-arts education acquaints boys with a variety of craft activities and often provides the basis for hobbies that can be further developed out of school hours in the home workshop. The industrial-arts education teacher makes a special effort to promote the development of the home workshop for the boy and girl with mechanical ability and interest in self-expression in the crafts.

5. *Give consumer knowledge about the selection and use of the products of industry.* The modern industrial-arts education course is divided into large related learning areas. The most widely used instructional areas are: planning, metalwork, transportation, housing, ceramics, textiles, grahic arts, and electricity. Each one of these instructional areas encompasses a large section of the trade and industrial world. For example, the graphic arts includes printing, bookbinding, papermaking, and illustrating; ceramics includes brickwork, glass, cement, and pottery; transportation includes aeronautics, waterway, railway, and the automobile; planning embraces the work of the sketcher, draftsman, blueprinter, designer, engineer, tracer, and checker; housing includes the trades of the mason, carpenter, cabinetmaker, plumber, heating engineer, plasterer, and decorator; metal includes the occupations of the machinist, molder, patternmaker, and structural steel worker; textiles include such activities as spinning, weaving, and dyeing; and electricity includes power, and communication.

It is obvious from a brief statement of the instructional areas of industrial-arts education that the shop and drawing courses of today have developed in line with modern progressive trends in all education. Industrial-arts courses are considered an integral and fundamental part of the educational program and are not isolated or formalized as was too frequently the case in the early development of manual training.

It is obvious from a study of these objectives that industrial-arts teachers have a significant contribution to make to the field of general education. Futhermore, over 30 per cent of the objectives of industrial arts mention directly that the purpose is to interpret industry, give guidance and help lay the foundation for possible future vocational pursuits in the fields of the trades and industries.

Industrial-arts teachers can help in the counseling procedures of boys who may be interested in the trades or industries as a career. In the Chicago schools, where 40,000 boys are taking industrial-arts courses, the following educational activities play an important part in the counseling procedures.

1. In the ninth grade a broad industrial-arts laboratory course is offered which includes transportation, metals, housing, textiles, graphic arts, electricity, ceramics, and planning. Every boy has an opportunity to work in all these fields for five weeks with five double periods per week.

2. At least two well-organized trips to industries are taken each semester. This gives the boys an opportunity to see large industrial plants and to meet the executives and workers.

3. Every two weeks the boys have an opportunity to view sound motion pictures dealing with industrial subjects. These motion pictures are planned as a lesson with introduction and follow-up by the industrial-arts teachers.

4. Each industrial-arts laboratory is equipped with a library which includes books and magazines dealing with industry, its processes and developments.

5. The industrial-arts laboratory teacher keeps a progress chart on the wall so that a pupil may note his progress as compared with that of his classmates.

6. Many of the boys are tested for mechanical aptitude on the informational and manipulative phases of their industrial-arts courses.

Industrial-arts teachers should be able to make three tentative classifications of boys in so far as an industrial career is concerned, namely, those that are below average, those that are average, and those that are superior. Most industrial-arts teachers would agree that boys who have intelligence, mechanical aptitude, good personality, and an interest in trade and industry can succeed in many different lines of industry as well as in the professions and numerous types of white-collar jobs.

Industrial-arts teachers can and are making valuable contributions to counseling procedures; however, they should do more. Industrial-arts teachers should be counselors of boys and girls about industry and its vocational possibilities as well as instructors in the materials, processes, and sciences of modern industrial practice.

Due to the complexity of the problems of the industrial students and the changing trends of our technological society, the industrial-arts education teacher must constantly study the field of industry and the best counseling procedures, if he is to meet the obligation which has been placed on him.

Fig. 1. Printshop at the Timken Vocational High School, Canton, Ohio, illustrating well-arranged and carefully selected equipment

Examples of Good Housekeeping

F. THEODORE STRUCK*

Shop teachers are judged, more than is generally realized, by their *housekeeping*. Not only supervisors and administrators, but school patrons and the general public associate an orderly, well-kept school shop with good management. Conversely, school shops and laboratories that give evidence of lack of orderliness and system in the placement of equipment and supplies, and in operation, cause one to wonder whether the instructor in charge is a good manager.

Good housekeeping is an essential part of good shop instruction. It is unquestionably an asset to anyone if he is orderly and systematic in what he does. What supervisors and parents think about the orderliness or lack of orderliness of a shop teacher may be of considerable importance in that person's professional advancement. But that is a relatively small matter compared to the instructor's influence upon the lives of his students.

Orderliness and good housekeeping are not general attributes but specialized ones. A person may have been taught at home to be careful in his manner of dress. That does not guarantee that he will be equally careful with shop tools, equipment, and supplies. Conversely, he may be somewhat Bohemian in his manner of dress and yet be very careful with the instruments and materials of his occupation. It follows, then, that many students must be taught to be good managers if they are to become that. And the best way to teach them is for the shop teachers to develop right habit formation in his students through making it a practice to keep his own shop in *shipshape* condition.

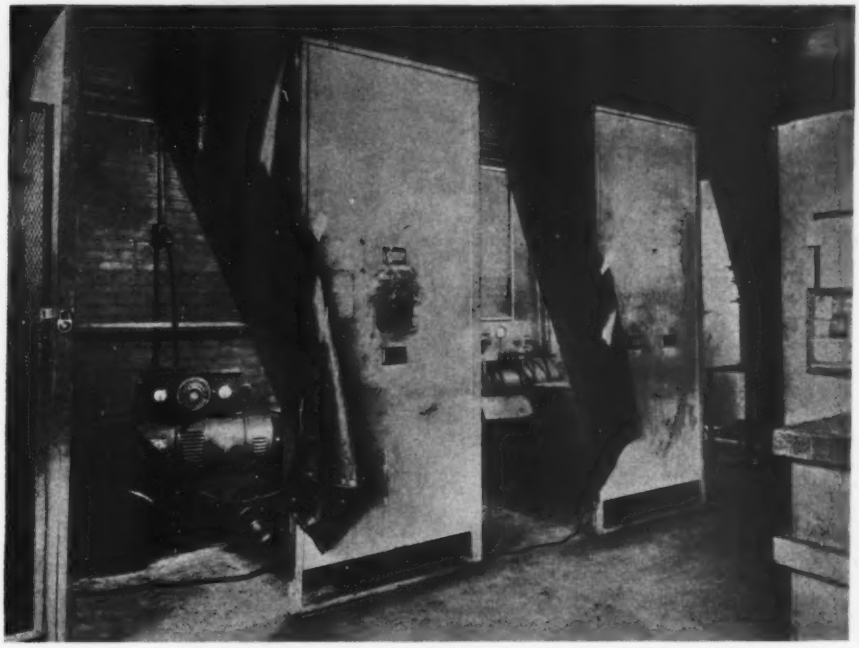

Fig. 3. Illustrating appropriateness of booth panels and curtains in welding units of the Bloomfield Boys Vocational School, a part of the Essex County, N.J., Vocational Schools

The story is told of a well-known automotive executive, who incidentally operates an effective trade school, that when he finds a production department that is in disorder, he requires the foreman to stop production until the cause of confusion is eliminated.

Practical Standards

We should like to emphasize that by *good* housekeeping we mean housekeeping that is thoroughly practical — not artificial and superficial. When we step into a shop or laboratory we are most concerned about these things: (1) The general atmosphere — is it genuinely democratic? (2) The resourcefulness and initiative of the students — do they go ahead working independently or in cooperation as the need may be when the instructor is busy at something else? (3) The quality of the students' work measured in terms of valid standards, and (4) The evidences of good housekeeping and management. There should be abundant evidence that work is being done; that the school shop is a workshop in the true sense of the word, not a museum nor a place where varnished shop benches are seldom used for fear that they become scratched.

Fig. 2. Showing neat arrangement of hand tools at the Timken Vocational High School, Canton, Ohio

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Fig. 4. Machine shop toolroom at the Stonewall Jackson High School, Charleston, W. Va.

Resourcefulness With Material

In the home a good housekeeper is one who selects materials wisely and uses them with discrimination. This applies to good housekeeping for shop teachers. A real test of one aspect of good management and good housekeeping — the two go together — is to see what the instructor is able to do with the leftovers. In the neatly arranged, well-equipped printshop of the Timken Vocational High School, Canton, Ohio, shown in Figure 1, there is storage space where the trimmings or leftovers of stock can be stored for future use. Good general lighting is supplemented where needed by individual lights; metal furniture makes housekeeping a pleasure and adds to the durability of the equipment. The type cases are arranged so as to conserve floor space, use natural light to the best advantage, and enable students and instructor to move about without disturbing others.

Convenience

Where hand tools should be kept, and how they should be made available depends greatly upon the nature of the school shop, its facilities, size of classes, and the nature of the students being served. In machine, auto, aircraft, electric, sheet-metal, and plumbing and heating shops, many instructors prefer to use a toolroom where most, or all tools, are issued through some kind of a checking system, such as using metal checks as is often done in industrial establishments.

In other shops some of the tools are kept in conveniently located cabinets, on wallboards, in individual kit containers, or at the work stations. The system used should be worked out with due regard to convenience, ease of checking, and security. Figure 2 illustrates how neatly and conveniently the supply of individual bench tools are kept in a woodworking shop of the Timken Vocational High School, Canton, Ohio. Attention also is called to the exhaust system and how the pipe is carried under the floor from the universal saw in order to avoid an overhead pipe in the central part of the shop. Note the quality of the equipment and such essential features as the wall display board, and the fire extinguisher near the spacious entrance doors. The ample aisles and space around the machines contribute toward safety and ease of shop management.

Suitability to Purpose

Another principle involved in good management is to see to it that equipment is selected with due regard to its suitability for the purposes intended. To be sure, some schools have greater financial resources than others. The point at issue is whether or not the equipment is adequate and within the range of propriety and cost, all factors considered. The relationships between proper selection of equipment and ease of housekeeping and management are clearly evident in Figure 3, which shows a part of 15 arc-welding and 35 acetylene-welding units in the Bloomfield Boys' Vocational School, one of the schools comprising the Essex County, N. J., vocational schools.

In the photograph the curtains are temporarily taped back to show the interior of the booths. Under normal conditions the curtains hang so as to exclude light from the eyes of those who pass by. Ventilation is aided by open spaces near the floor in booth panels, and by having the booths open overhead. Visitors may refer to the notices and inscription plates on the outside of the booths.

The Toolroom

Reference has been made to the fact that toolrooms are favored by instructors in a variety of school shops. Figure 4 shows a part of the machine-shop toolroom of the vocational division of the Stonewall

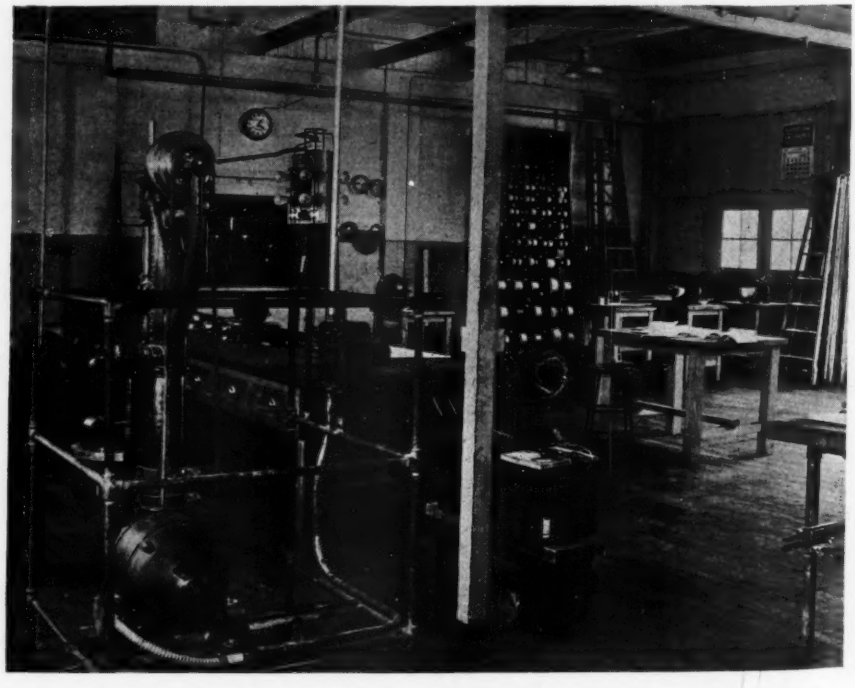

Fig. 5. Showing a convenient, economical way of storing wiring and cord in an electric shop of the Technical High School, San Jose, Calif.

Jackson High School, Charleston, W. Va. Among the features specially worthy of mention are the metal storage cabinets with their variety of shelves, drawers, and bins. The rack for holding lathe dogs, like the open slanting shelves are of distinct help in rapid checking and put the tools and accessories within easy reach.

The sturdy diamond-mesh grille with its wicket just above the ample counter will appeal to shop teachers. The record cabinets on the counter, and the scales at the far end of the toolroom are there to serve very practical purposes. The storage space under the counter and the general compactness are added features.

Storage of Wire and Cord

One of the problems that confront teachers of electricity and sheet-metal work in particular is how to store and make available wire of various kinds, electric, and other cord of different sorts. Consideration must be given not only to compact, neat, and accessible arrangement, but particularly to a plan that will conserve material by discouraging students from using their pliers on various parts of a coil as sometimes happens when a coil of wire is placed where it can be *attacked* easily at various points of its circumference.

A good way of storing wire and cord for ready shop use is illustrated by the special rack seen in Figure 5, showing an electric shop of the Technical High School, San Jose, Calif. It will be seen that the rack is arranged so that the lighter spools are near the top, the heavier ones nearer the floor. Labels, showing merely as white spots in the photograph, help to identify the material in stock. Students find it easiest to cut the stock from the one, easily found end of the spool or coil.

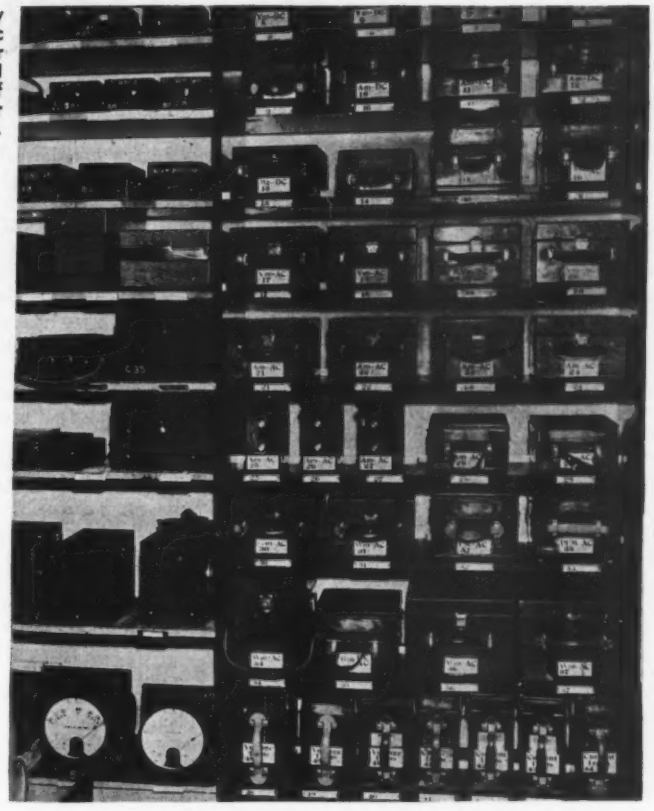

Fig. 6. Showing orderly arrangement of electric instruments in the meter room of the electrical technical laboratory of the Pasadena Junior College, Pasadena, Calif.

Instrument Storage

Good housekeeping is illustrated by the way electric instruments are stored in the meter room of the electrical technical laboratory of the Pasadena Junior College training center represented in Figure 6. It will be noticed that each instrument bears a number that corresponds to a similar one indicating the place where it belongs in the instrument room. Since the numbers are arranged consecutively it is an easy matter to locate the instrument.

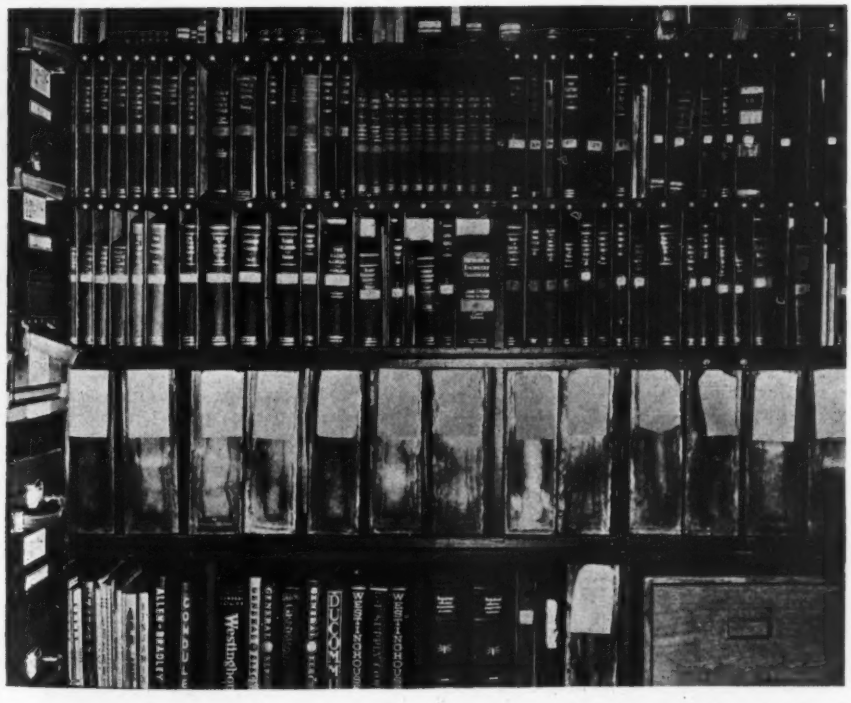

Fig. 7. A section of a shop reference library of the Pasadena, Calif., Junior College, illustrating careful selection, systematic arrangement and good housekeeping

The Shop Reference Library

The chief purpose of a shop reference library is to make readily accessible to students, books, periodicals, catalogs, and other reference material such as photographs, drawings, charts, and clippings when they are needed. The shop teacher may do much to assist students in becoming familiar with source material vital to occupational proficiency. It is desirable to have in the shop library, or in the shop study center, frequently used source material that is specifically related to the units of learning. The shop reference library should not be considered as a substitute for the general library.

To determine what should go into a shop or departmental library requires judgment and due consideration to a number of factors, such as funds available, and the like. To operate a shop library calls for accuracy, neatness, adaptability,

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Rugged Refinement

DEAN M. SCHWEICKHARD*

Apparent Contradiction

The common conception of ruggedness may appear to be so contradictory to that of refinement as to render any joint consideration impossible or incongruous. As a matter of fact, each possesses some qualities without which the other can never come to its richest realization. The judicious combination of the two may produce increasingly valuable results which continue to multiply themselves.

One who prides himself upon being rugged may look upon that trait as a symbol of strength and endurance. He may even feel that to maintain the kind of ruggedness he seeks he must be rough and crude. Such a one is likely to think of any sort of refinement as weak or effeminate.

It is true that too much of a certain brand of refinement may destroy the possibility of remaining or becoming rugged. No sort of real refinement can long endure without a solid foundation or background of ruggedness. An individual, a family, or a nation who seeks a continued state of what they look upon as refinement at the expense of fundamental ruggedness is on the way to decay. Just as much the one who makes ruggedness too prominent without tempering it with appropriate refinement is lingering in a temporary state of savagery.

An apt figure may be drawn from the great industry which has to do with petroleum and its products. Crude petroleum is sturdy looking and may be used for certain purposes as it comes from the earth. Its specific effectiveness and the variety of uses to which it may be put are greatly multiplied through the process of refinement.

One of the great refining companies utilizes the same principle with prospective personnel. Young men come to them with all the presumed refinement acquired through a college education, but when employed they are put into the very crudest jobs in the industry. First, they must prove they possess the rugged qualities the industry requires. When that has been satisfactorily demonstrated, the climb is begun toward the goal of ultimate refinement in one of the many differentiated branches of service involved.

Examples From Life

Abraham Lincoln was known far and wide in his youth as a young man of great physical strength. His gigantic frame and his uncommon muscular power combined to give him an appearance of awkwardness. Those who viewed him lightly and casually saw only the rugged exterior which they may have considered a desirable asset in combating the frontier life of his day.

Besides having a rugged body, he had a rugged spirit, and it was the lifelong refinement of that rugged spirit which held the nation together when it was in danger of being torn to pieces. A little glimpse into that great man's inner refinement is revealed in an account of his having dismounted from his horse to pick up a young bird from the ground and replace it gently in the nest from which it had fallen.

The Newfoundland dog is used by many parents in isolated or dangerous districts as a protection for small children. This dog impresses one immediately with his size and strength. He is the very symbol of the power to combat and overcome any enemy or danger which might approach a child by air, land, or water.

Along with the necessary physique, this dog has been found to have the keenness of brain to detect inpending danger and act before it is too late. He might have both these things and still not be entrusted with looking out for the safety of children if his nature had not been refined by gentleness.

Ruggedness unrefined is like power uncontrolled, it is capable of potential well-being or destruction. The power of wind, water, electricity, steam, or explosive is such as to be violently disastrous to life and property when permitted to run rampant. When properly directed or controlled, these forces may be utilized for the unlimited benefit of man. The relationship between the ruggedness of natural forces and the necessity for refining them is usually obvious, but that relationship is not always so readily detected in human affairs.

The Pilgrim fathers seemed to grasp its significance in their demonstrated willingness to brave the rigors of an ocean voyage under primitive conditions in their quest for refinement of spirit. Furthermore, they continued to combat the ruggedness of a new and unconquered continent in their pursuit of the same state of life. They retained a vivid vision of the goal of refinement toward which they strove, and sought to maintain rugged minds and bodies in which a refined spirit might thrive.

Ever Present Needs

In seeking refinement there is always the danger that the quest may result in a weakening process rather than a strengthening one, for there is a kind of refinement which weakens or enervates. The livestock breeder who seeks to develop certain qualities in his stock may find ultimately he has robbed his herd of their power to resist disease and climatic conditions endured by their ancestors. Similarly, the combination of delicate qualities in plant life to produce an ever more delicate variety may result in the elimination of the sturdy qualities necessary to survival. As a matter of fact the only kind of refinement worth seeking is that which takes account of desirable qualities and seeks to make them more readily usable.

That kind of refinement is involved in the skillful and painstaking execution of a complicated mechanical drawing. The general idea of a steel or concrete structure, or a rough sketch representing it is not adequate for the workmen to follow without minute refinement in the drafting room. Likewise this same sort of refinement appears in machining the metal parts of a mechanism, every part of which must perform its function in perfect relation to the other parts. The refining process begins with cutting off appreciable quantities of metal, but many times may end with grinding or even polishing before completion.

The artist or the sculptor may be looked upon as a dreamer incapable of dealing with the rugged things of life, but when he chisels a statue from a rough piece of marble he exhibits the ability to bring the cold and lifeless stone to such a state of refinement that it stirs a spark of life in human hearts. Not satisfied with the refinement of pieces of stone which could be taken into the shop, sculptors with a great vision blasted, chipped, and refined the face of a cliff in the Black Hills of midwestern America until the faces of famous presidents were brought out in rugged relief for the inspiration of generations to come.

The same kind of refinement is the fundamental requisite in becoming an expert boxer, wrestler, tumbler, swimmer, wood turner, plasterer, painter, or farmer, with most of the refining process taking place inside the individual. The power of man for the refinement of the forces of life is not limited to the forces within himself. It must start there, but without is seen to emanate into limitless realms beyond. He trains the elephant or other animal whose ruggedness and physical strength far surpass his own, because he has become a master at the art of refinement.

The leader among men is the one who has more thoroughly refined the ability and technique required in perfecting the details of organization in an industry, a modern school, a civic celebration, or many another constructive movement. Such leaders are the ones who have led the way in turning the wilderness into a modern community, and have brought

(Continued on page 378)

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

John J. Metz, Editor

A Worth-While Addition

The shop teachers who have had the pleasure and the privilege of a tour through the Chicago Museum of Science and Industry, and know of its educational value, will be pleased to hear that the Carborundum Co., Niagara Falls, N. Y., are contributing an extremely interesting educational exhibit portraying another of the epoch-making discoveries which has meant so much in the industrial progress of the present age.

This exhibit tells the story of modern manufactured abrasives in an interesting way. One of the features is the reproduction of the laboratory of the late Dr. Edward Goodrich Acheson in which he created the first man-made abrasive, silicon carbide, to which he gave the name Carborundum. The old laboratory, originally located at Monongahela City, Pa., is reproduced in every detail. There is a replica of the old worktable on which was placed the iron melting pot in which Dr. Acheson created the first few crystals of an abrasive, destined to revolutionize grinding. Bending over this pot is a life-size figure of Dr. Acheson, just as he stood when he made his momentous discovery.

Besides this, there is a revolving mound of the beautifully colored crystals of the silicon carbide, better known to most craftsmen as Carborundum. The beauty of these crystals is further enhanced by mounting them on a circular block of black marble.

The detailed processes involved in producing the various abrasives manufactured by the Carborundum Co. are portrayed in a series of dioramas showing exact models of the electric furnaces in which the abrasives are produced. Other dioramas show the crushing and grading of the crude abrasives, the making of grinding wheels — in fact, all of the major operations necessary in producing modern abrasive products. Above each diorama are photo murals which show the actual scenes from which the dioramas were made. Explanatory text completes the story.

Other photo murals show how many of the varied grinding operations are performed in all types of industrial plants. There also are two turntables to acquaint the public with the many and varied tasks done by abrasives in modern industry.

To complete the whole story, visitors will have the opportunity of hearing and seeing a short version of a sound film showing Dr. Acheson re-enacting his first experiment, and also giving them an intimate trip through the Carborundum plant, showing the electric furnaces in actual operation, as well as many other scenes depicting the manufacture of abrasives and abrasive products.

The Carborundum Co. is to be commended for this fine piece of educational work. The value of industrial museums is only slowly being understood, and it is to be hoped that other nationally known producers of the various articles now in common use, will follow this latest example and offer the public a similar opportunity to learn about other interesting phases of our complex industrial civilization.

The interest value of such industrial-museum exhibits is great, but the educational value to young and old alike, is very much greater.

The Value of Industrial Arts and Vocational Education Recognized

Lieut. Col. W. S. Paul, head of the personnel procedures section of the adjutant general's department of the U. S. Army, makes a statement that should cheer up every teacher of industrial arts and vocational education, even though it says nothing that is surprising or new to the shop teachers of America.

According to the colonel's statement, he finds his work of interviewing, testing, and assigning new recruits and selectees much easier because so many of them have had training in school shops in such subjects as electricity, mechanical drawing, auto mechanics, machine-shop practice, photography, and the like. This, so the colonel says, warrants their assignment to army jobs in which their experiences, whether meager or extensive, may be utilized to the betterment of army efficiency, and to the greater satisfaction of the men so assigned. It also shortens materially the special army training, which must be given them.

He also says that in thousands of instances, this elementary training, plus the additional training given by army experts, will prepare the men for later civilian jobs in occupations for which they could not otherwise qualify.

Both vocational and industrial-arts teachers have preached the value of their offerings to the public for many years. Industry, one would expect, should have realized the intrinsic worth of the shop courses in the schools years ago. But all this time, the efforts of the proponents of industrial arts and vocational education were all too often met by apathy, adverse criticism, and antagonism, even by those who should have seen and made use of the knowledges and skills that had been instilled into many students.

The observations made by Col. Paul also corroborates the findings of those who supervise the selection of the trainees under the National Defense Program. The selectees from the NYA groups who had industrial-arts or vocational education experiences at school, could derive profit from the defense program in a much shorter time than those who did not have these experiences. They were, therefore, able to help produce much more quickly then, the things which our country needs so urgently at the present time.

It is to be hoped that our industrial leaders will all learn that the school shop, through the training that it offers in both industrial-arts and vocational courses, is endeavoring to produce youthful workers who have had fundamental experiences commensurate to their physical powers and capacities, that will form bases for future development under actual working conditions in the commercial and industrial environment of the workaday world. This, however, will require the expenditure of much selling effort by everyone connected with this type of work in the school. Only continued exertion will secure the results which are to be achieved, and everyone connected with industrial arts and vocational education must realize that it is their individual obligation to do a part of this selling job.

An In-Service Training Program as a Leisure-Time Activity

ROY A. RADTKE*

This story concerns a rather unusual if not unique type of in-service training program, a program which was started more or less as a hobby during leisure hours, and which gradually turned into a regular in-service training project. Little did anyone dream when a small group of teachers first got together three years ago last April, that the organization they were then forming would become the pioneer in a new kind of teacher-training program.

When the writer a few years ago introduced several important changes in the industrial-arts program in the Milwaukee public schools, he found a shortage of teachers adequately prepared to teach these newer subjects. To compensate for this lack of experience, the usual procedure was resorted to, of giving demonstrations, preparing instruction sheets, and holding special conferences; but to several of the more experienced teachers interested in maintaining a high standard of workmanship and efficiency, this was at best a slow process. These men wanted a more intensified program, and were willing to make sacrifices to attain that end.

The result was that one spring afternoon, about three years ago, five of these teachers approached the writer and asked if he wouldn't join them in a little "Hobby Club" they were forming, the purpose of which, they said, was to study some of the more recent changes in the industrial-arts program, and to learn how to work with the sheet metals, such as copper, brass, sheet steel, pewter, and aluminum. This looked like a grand opportunity, and the invitation was readily accepted.

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1. Fred Gaertner, better known as Fritz, instructor of the home workshop. He is shown in his shop, with tools, equipment, and a few projects as a background

2. Shows opposite wall of shop

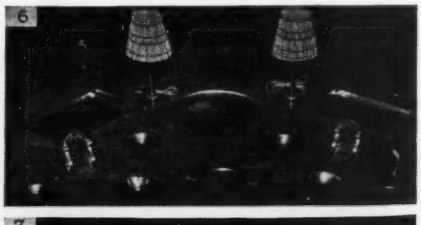
Ordinarily, in starting any new venture, problems arise which require careful deliberation, but in this case everything started off very smoothly. One of the first problems was to agree upon an acceptable meeting night, and another was to find a suitable meeting place, but neither of these presented any difficulty, for during his leisure hours one of the teachers had built a workshop in the basement of his home, and invited the men to use it on Friday nights. This invitation was readily accepted, and meetings began shortly thereafter.

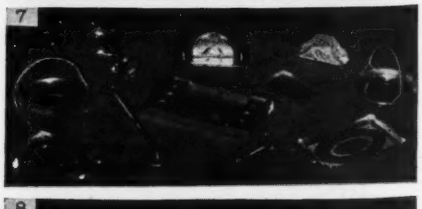
For several weeks everything went along well, but then the men began to get a little bit restive. It wasn't that they were dissatisfied with their work or that they weren't making suitable progress, but rather it was that inner urge to do better the thing that they were going to do anyway, that began to exert itself. In trying to satisfy these natural impulses other influences began to show potential possibilities. It was recognition of these impulses and influences that forecast a new procedure in conducting the hobby club. Several suggestions were proposed for continuing the class, but the plan which received unanimous approval was one which called for employment of a highly skilled craftsman to teach the group the fundamentals and skills of the metalcraft trade. It was furthermore agreed that this teacher of teachers should be a skilled artisan, recognized as such in his profession, and capable of imparting his knowledge and skills to others. The requirements were set unusually high, but fortunately a man with these qualifications was found and employed.

"Fritz," as this teacher of teachers was called, was well qualified for this job through his long years of experience as a practical craftsman in one of Milwaukee's leading fixture industries. Having learned his trade in Germany, he was acquainted with European as well as American designs, designers, and techniques. While he had had no previous teaching experience, he was adept at adjusting himself to his new task, and outlined a course of procedure which would have done credit to a more experienced teacher.

It was the intention of the group to employ Fritz for a limited time only, or until such time as the members felt they had

3, 4, and 5. Pewter sugar and creamer sets, vases, and sandwich trays made by members of the teachers hobby club





6, 7, and 8. A variety of jobs designed primarily for use in the classroom

At 8 are shown projects made by boy and girl high-school students

acquired sufficient skill to again shift for themselves; but the class has just continued on and on, and Fritz is still the instructor. There were several reasons for this:

1. It didn't take long to discover that the skills and techniques of the metalcraft trade could not be acquired in a few lessons.
2. It was obvious from the beginning that Fritz had more to contribute than had been anticipated.
3. The opportunity to experiment with new mediums opened new vistas of interest.
4. The release from professional restraint was a unifying force in forming closer friendships.
5. While the character of the work was constantly improving and reflecting the increasing experience of the group, yet the hobby-shop idea with its avocational concept was retained.
6. The opportunity for self-expression through interesting projects was a means of stimulating individual effort.
7. Of unestimable value toward professional growth was the exchange and interchange of information and ideas.

However, the factor which perhaps more than any other determined the trend of the group, came when other industrial-arts teachers heard what the club was doing and saw some of its finished projects. So enthused were they at what they saw, that most of them wanted to join the club immediately. Unfortunately, this was impossible, because the shop which was then being used was too small to accommodate additional men, nor was it available on any other night in the week. Consequently, these men had to wait until new quarters could be found and new arrangements made. However, before anything definite could be done, the summer months with their vacation days had rolled around, and these offered an opportunity to reflect upon the future possibilities of this unique organization. Before closing for the summer, every man in the original group expressed a desire to be back in the fall, and, with at least twice as many more men wishing to join the organization, the future of the club looked quite hopeful.

In the meantime, Fritz was approached and apprised of the number of men wishing to join the metalworking class. After carefully considering the situation and the possible future growth of the club, Fritz agreed to build a workshop in the basement of his home. This shop was ready when school opened in the fall of 1939, and, as had been anticipated, 18 teachers signed up and were ready to get started just as soon as the classes could be organized. Before the winter was over this number had increased to 22.

Of course, this shop was not large enough to accommodate all the men at one time, so they were divided into three groups. One group (the original members remaining together as a unit) met on Monday nights, another group on Wednesday nights, and a third group on Saturday mornings. The evening sessions were scheduled to begin at 7:00 and last until 9:30, and the Saturday morning sessions from 9:00 until 12 noon. However, in this enterprise time was an irrelevant factor; everyone came early and stayed late. Quitting time was usually when the men got tired.

But, alas, the difficulties of the club were not over. After having withstood the din and noise of 22 energetic learners throughout the winter nights for one year, Fritz's family decided it would be more restful for their nerves if the club met elsewhere. While moving was again in order, this did not create much of a stir, because the men were more or less aware of its coming. Perhaps the fact that they were so enthusiastic about the work and expressed a desire to come back again in the fall made them feel that provision somehow would be made for them. This assurance of their return and the continued interest of the men in this particular type of work encouraged Fritz to remodel one half of his garage into a home workshop.

This new shop, while not particularly large, was a commodious little place, well arranged and peculiarly adapted to this sort of program. Six persons could work here with ample room, but due to the continued growth of the club, the number now having increased to 26, a good share of the time 7 or 8 men worked in this shop. The equipment, while not elaborate, was adequate for this purpose. It consisted of 2 power machines, one a small drill press and the other a combination buffer and grinder, a bench gas furnace with 2 Bunsen burner outlets, 6 metalworking vises, metal stakes, forming, raising, and planishing hammers, several surface plates, pliers, snips, layout tools, chasing and dapping tools, and an assortment of hardwood blocks. These hardwood blocks are mentioned last, not because they were relatively unimportant; on the contrary, they played a very important part in this course. Only one who has watched a master craftsman work can appreciate the tremendous amount of work that can be made with or over a wooden block. Of the many skills learned and acquired during the past three years, that of forming and shaping metal over hardwood blocks was perhaps the most valuable, practical, and useful. It was one of the outstanding contributions of this course.

When compared with modern classroom practices, Fritz's classes were small, but when one considers that this was a private enterprise, small classes were not only

9, 10, and 11. Walter Wutke, Edward Range, and R. A. Radtke, members of the industrial arts teachers hobby club

12, 13, and 14. Paul Nickchen, Hugo Heise and John Rashinsky, members of the industrial-arts teachers hobby club

permissible but desirable. They permitted a maximum of individual instruction in a minimum of time. To compensate for these small classes, each individual paid a fee of $1 per session. This included, besides instruction, the use of such sundry items as solder, flux, steel wool, acids, emery cloth, buffing compound, and metal polish, which Fritz provided. It did not include any metal which the individuals used in making projects. Speaking about projects, it would be impossible to enumerate the number and kinds made by these men over a three-year period. Some of the jobs ranged from the simplest copper trays to the most elaborate pewter sugar and creamer sets. The beginner usually followed a course of procedure outlined by Fritz, but after finishing 2 or 3 orientation jobs he was at liberty to tackle more difficult tasks.

The kind of project attempted usually depended upon one's ability, initiative, and experience. However, since these men were more concerned about improving their knowledge, skill, and information about sheet metals such as copper, bronze, aluminum, pewter, and the like, than they were about satisfying any selfish desire, the range of jobs was quite extensive. While many of the jobs were made for personal use, a good share of them were made as models for classroom use.

The following will typify only one of the many ways in which the collective effort of the group contributed to the general advantage of all teachers. One of the men decided to make a sandwich tray 10 in. square. He drew up his design, worked out his job, and then presented it to the members for criticism. So many suggestions were offered that, before many weeks had passed, several others decided to design a sandwich tray, each one adding his own individual interpretation of what this tray should look like. The result was that there were some rather pleasing designs. Thus, in a practical way a good many teachers profited from the combined ideas and efforts of the group. It was this willingness to experiment, to exchange and interchange ideas, to work for the good of all, to sacrifice for a common purpose, to contribute skill, talent, energy, and effort for the advancement of industrial arts in general, that stimulated interest and made this in-service program so worth while.

As one of the objectives of the industrial-arts program, teachers have been active in encouraging the building and using of home workshops. Perhaps this outline suggests a new use of the small home workshop; at least, that is its purpose. The chances are that when the defense program has run its course, the worthy use of leisure and the development of home workshops will again become a more prominent part of our industrial-arts training program. It is for the future that this kind of an organization offers possible suggestions.

GOOD HOUSEKEEPING

(Continued from page 373)

and system. Figure 7 shows a section of the neatly arranged, systematically organized reference library in the electrical shop of the Pasadena Junior College training center. The picture illustrates an important aspect of good school shop management and housekeeping.

RUGGED REFINEMENT

(Continued from page 374)

about the transition from a state of savagery to one of civilization.

The need of every generation is for each individual to strive for the utmost refinement of the powers within him and the resources about him toward the end of greatest usefulness. This sort of rugged refinement is the very essence of effective defense and the surest guarantee that the things by which men live shall be preserved.

Outline of Safe Driving Course

C. R. LINDSTROM*

The Three R's and the Two R's of Education

From 35 to 40 million people, approximately one third of our total population, operate motor cars. Schools have long recognized the need of teaching students the three fundamentals of education commonly known as the three R's. The best people make mistakes in *R*eading, in w*R*iting, or in a*R*ithmetic, and usually no one is the worse off except for some embarrassment. But making mistakes in driving has given to America the blackest record of any nation in the matter of fatal auto accidents. More than 100 people are killed in auto accidents each day. Such a record demands that our car drivers know the *R*ules of the *R*oad and certainly no organization is in a better position to teach these two R's than our public school system. The State Teachers College at Peru, Neb., is offering this as a college course, and has been teaching a course in the high school designed to eliminate auto accidents, or to be more exact, to eliminate *auto mistakes*. An auto accident, in most instances, is *someone's mistake*.

Experience in designing the course of study for such a subject has proved that in the high school the course should be a science rather than a social study. The student should be placed in a position in which he becomes acquainted with the car he drives; how it works; he should know the roads he travels, the rules and regulations governing travel, and the hazards he may meet. As a science it will involve both laboratory and classroom work.

The Course of Study

A suggested outline of this course follows. It is grouped into units for convenience and the units are divided into classroom and laboratory activities designated.

*Peru State Teachers College, Peru, Neb.

A Course in Safety Education

Classroom	*Laboratory*
A Nation on Wheels	
Growth of auto industry.	Visit factory or repair shops.
Economic values.	
Social values.	
The Car, Its Operation and Upkeep	
4-cycle principles.	Repair tire.
Power transmission principles, gears, shafts, etc.	Testing battery.
	Clean spark plug.
Tires and traction.	Adjust timing.
Electrical system.	Change oil.
Lubrication, fuels.	Lubricate car.
Common defects.	Inspect adjustment of brakes.
Body and chassis.	Inspect lights, clean and polish lens.
Braking systems.	
	Care of body finish.
Motor Vehicle Laws	
Traffic regulations.	Visit a courtroom trial of traffic violation.
Use of highways.	
Violations.	
Equipment on cars.	
Licenses.	
Registration.	
The safety patrol.	

The Technique of Driving

Classroom	*Laboratory*
SITUATION DEVICE[1]	DRY DRIVING[2]
Set up driving hazards that are involved on the actual highway. Take time to discuss each situation.	1. Learn to start motor properly. 2. Learn to engage low gear and to accelerate evenly.[3] 3. Learn to engage second without clashing gears, and to make the proper acceleration. 4. Learn to engage high properly. 5. Learn to brake evenly. 6. Learn to disengage gears. 7. Learn to guide. 8. Learn to park on inclines. 9. Learn to use gears as a brake. 10. Learn and practice giving signals as you drive. 11. Learn to back up. 12. Learn to start on inclines. 13. Learn to change gears on hills. 14. Learn to start on hills. 15. Learn to park on shoulders. 16. Learn to gauge speed on curves.
A. *The Straightaway* 1. Speed. 2. Passing. 3. Following too closely. 4. Dust. 5. Parking. 6. Sudden braking. 7. Not signaling for left or right turn. 8. Hogging the road. 9. On wrong side. 10. Failure to watch for signals of both driver and highway. 11. Failing to slow up for livestock. 12. Failing to use meeting light. 13. Cutting in too soon after passing. 14. Driving when tired or sleepy. 15. Overdriving lights. 16. Failure to give attention to driving.	
B. *Curves* 1. Speed. 2. Passing. 3. Parking. 4. Hogging the road. 5. On wrong side. 6. Not using meeting light. 7. Misjudging traction, as ice, rain, sleet, snow, etc. 8. Sudden braking.	
C. *Hills* Speed.	Learn to gauge grades.

[1]See illustration of situation device.
[2]Simulating the condition of starting a motor and changing the gears, but with the motor not running.
[3]This practice should be done on a level road where there will be no traffic or any dangerous obstacles.

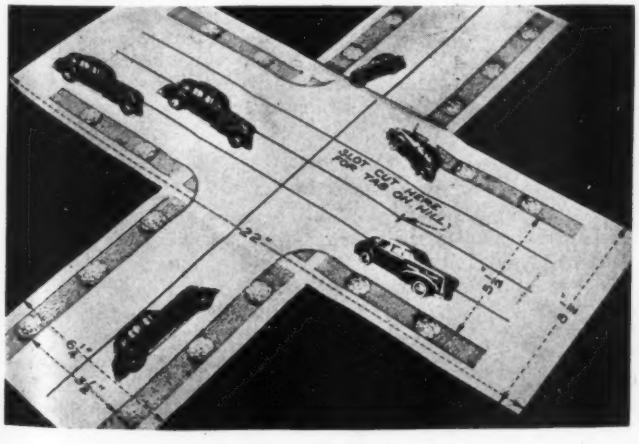


Fig. 1. Showing either street or highway intersections

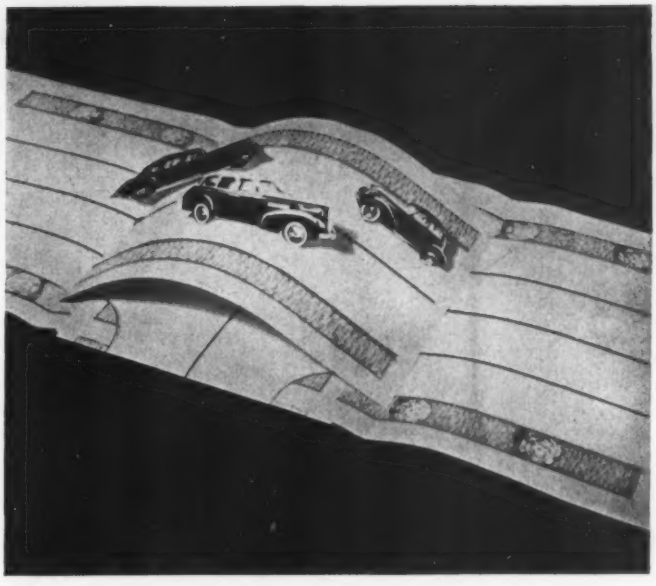


Fig. 2. Situation device in use to demonstrate "Passing on Hills"

Classroom	*Laboratory*
Passing on hills. Following too closely. Parking on hill tops. Driving on center line. Failing to use meeting light. Driving on wrong side. Failure to brake with gears on steep hills.	Learn to brake with second gear and with low if necessary. Learn to apply brakes on hills properly.
D. *Railroads* Speed on approaching. Failing to observe railroad signal. Failing to observe railroad with no signal.	
E. *Highway Intersections* Failure to observe stop signals on trunk highway. Failure to observe the distance and speed of cars on trunk highways.	Learn to make turns.
F. *City Intersections* Failure to observe lights. Trying to beat the light. Traveling in the wrong lane. Stalling on intersections. Failing to signal. Taking right of way from pedestrian on left turns.	Practice city driving.
G. *Parking* Parking on highways. Not parking far enough from highway on shoulder. Parking on hillcrest. Parking at prohibited areas. Failing to engage gears when parking on hills or inclines. Parking without proper parking lights. Backing from parking.	Parallel parking practice. Practice parking on steep inclines. Practice parking from angle parking.
H. *Pedestrians* Crossing on red light.	

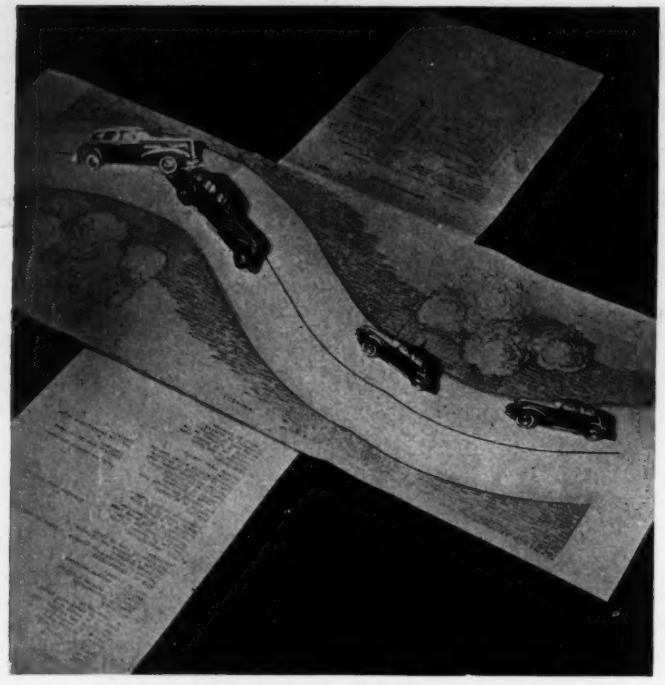


Fig. 3. Situation device showing "Passing on Curves"

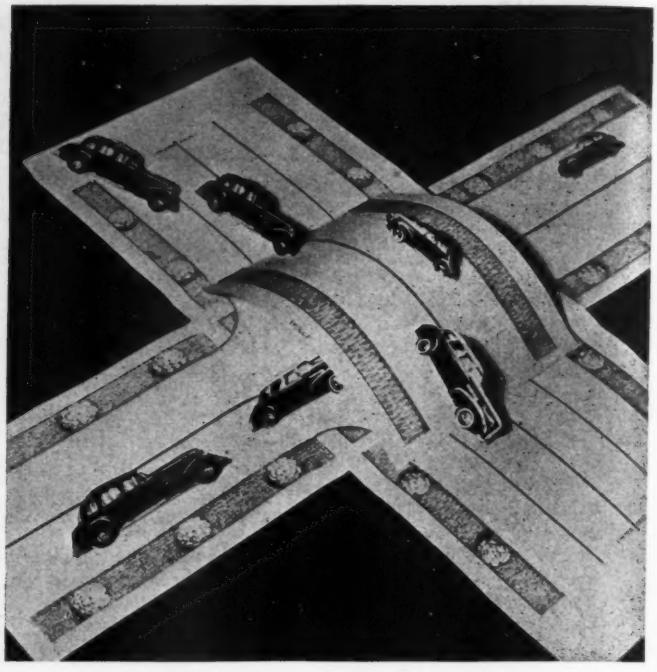


Fig. 4. Setup showing "Underpass"

Classroom	*Laboratory*
Darting out of parked cars	
Walking on highways on the wrong side of traffic.	
Loitering in streets.	
Playing in streets.	

Psychological Aspects of Motor Driving

Safety education in driving would not be complete without making a study of the driver. This phase of the course of study may be divided into three units: reactions, attitudes, and habits.

Reactions	
Braking distance and reaction test.	Reaction testing on simple reaction test device. See diagram of electrical device. (See INDUSTRIAL ARTS AND VOCATIONAL EDUCATION for May, 1940.)
Effect of stimulants, such as coffee, tea, driving pills, etc., on reaction time.	
Effect of alcohol on reactions.	
Attitudes	
Effect of the "Hurry" attitude in driving.	
Effect of good or poor "Concentration" in driving.	
Effect of the "Superior Complex" in driving:	
One arm driving.	Demonstrate the "Showoff Driver."[4]
Showing off.	"You Bet Your Life" (Slide Film).
Automatic driving.	"Death Takes No Holiday."
Effect of Distractions:	"Inertia."
Back-seat drivers.	"Night Driving."
Insects.	"Sentries of Safety."
Radios.	
Habits	
Effect of Lack of Concentration in driving.	Plan a trip and show the difference in time used in a "Hurry Trip" and a "Normal Driving" trip.
Effect of driving when fatigued.	
Effect of memory in driving. "Perseveration."	
Effect of "Boasting Driver."	

[4]Sound slide film may be secured from the National Conservation Bureau, 60 John Street, New York.

Aids in Teaching the Technique of Driving

The *Situation Device* shown in Figures 1, 2, 3, and 4, is an invaluable aid in the teaching of hazardous situations that may arise on the highway. Ideally, each pupil as well as the teacher should be equipped with one when studying road situations and road hazards. These may be constructed by the teacher, or information as to securing them may be had by writing C. R. Lindstrom, State Teachers College, Peru, Neb.

The Practice Car

To do effective teaching of driving, the teacher must be provided with a demonstration car, or provision must be made with the parents for the pupil to use the parents' car under the strictest supervision either of the teacher or the parent. The driving of the practice car must be done on a road where no hazards exist. The pupil should practice at least six weeks before making any attempt to drive on the open highway. Adequate insurance and property damage coverage may be secured at nominal cost.

How to Use the Situation Device

1. Insert the tabs of the "hill" in the slots. This will elevate the paper to simulate a hill, as shown in Figures 2 and 4.
2. Select the particular situation as "Passing on Hills."
3. Place the picture cars on the hill road to simulate passing on the hill and meeting an oncoming car at the crest of the hill. See Figure 2.
4. Show alternatives on the part of drivers to avoid head-on collision.
5. Fix the responsibility of the drivers in each case outlined.
6. Have the students discuss similar situations in their own experience.

The Girls Behind the Men Behind the Guns

EDWARD W. STLUKA*

"Defense production, by order of the Office of Production Management, must take priority over all else," states John Faville, Jr., state administrator of the National Youth Administration for Wisconsin. "Therefore it is natural that training of youth for defense production work

Milwaukee's young mayor, the Honorable Carl F. Zeidler, is keenly interested in youth and youth problems.

should take priority over all other types of training!"

Through its own intensified work experience program and the related training program of vocational schools, the Wisconsin NYA is doing its utmost to fulfill its share of responsibility to the National Defense Program. In 1940, nearly 5000 young NYA Wisconsinites found jobs in private industry. In the first six months of 1941, 6155 Wisconsin NYA youth were absorbed by private industry. Of these, 3947 were boys and 2208 were girls. Seventy-nine per cent of the boys and 64 per cent of the girls found positions in defense production.

In spite of the thousands of "work experienced" youth coming from NYA projects, however, there is already an indication of a shortage of capable labor in vital industries, and particularly of young men. Four factors are responsible for this increasing shortage: Conscription of young men for military duty; shrinkage of the backlog of unemployed men; the steady expansion of industry (and this is far from its zenith!), and the intensification of defense efforts by the declaration of a national emergency by both President Roosevelt and Congress.

That this situation has attracted the attention of Washington is reflected in a letter written by Sidney Hillman of the OPM and sent to industrialists all over the nation. In this letter, Hillman urges the full use of all local labor reserves (rather than have skilled labor migrate back and forth over the country) and strongly recommends the employment of qualified women to bolster the labor supply. "There are also women," states Hillman's letter, "who with training can be quickly prepared for employment in defense industries in occupations for which they have aptitudes and abilities."

It was natural, therefore, that both

"Training of youth for defense production work takes priority . . ." says John Faville, Jr., Wisconsin NYA administrator

NYA officials and Milwaukee civic authorities should take an interest in helping prepare women, particularly young women between the ages of 17 and 25, for defense occupations. With this in mind, Mayor

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"Newies" — NYA girls beginning their shop course — receive initial instruction on renovating old furniture in the center's woodworking shop

Chairs and tables for the work center's cafeteria are given finishing touches by NYA workers in the upholstery shop

The civilian and military population of a nation must be clothed. These NYA girls are gaining work experience in clothes and uniform designing.

Power sewing machines give work experience to a large number of NYA girls at the work experience center

Carl F. Zeidler, after study and discussion with Faville and Walter F. Eckers, Milwaukee area NYA director, appealed to the common council to have the city of Milwaukee sponsor a girls' work experience center. A rambling, vine-covered two-story factory building on Milwaukee's south side was selected. The city agreed to pay the annual rent and voted $1,000 for incidentals to be purchased.

With NYA youth labor assisting competent and qualified union workers, the interior of the plant was completely overhauled and renovated. Offices and first-aid rooms were partitioned off, construction of a dust eliminating system was started, and the lighting system modernized by the installation of neon lamps and reflectors (neon lights are considered a big asset to safety and health as they do away with both glare and deep shadows).

Divided into a series of "progressive" shops, the center permits NYA girl workers to "graduate" from one shop to another as their vocational ability and work experience warrant. "Newies," as beginners are called, usually start in the woodworking shop to get the "feel" of tools and simple machinery before being "graduated" to other types of work. Here, in the woodworking shop, the girls reconstruct and modernize chairs and tables (before sending them on to the upholstery shop), build cabinets, shelves, and tables for NYA resident centers, tables for the sewing-project shop, and ironing boards and bins for the laundry. The girls take to the machines and tools quickly and easily and seem to be delighted to find they can do "a man's job."

Color, race or creed make no difference in defense preparation

Some of these "newies," after absorbing sufficient work experience in the woodworking shop and related training at the Milwaukee Vocational School, "graduated" to the sheet-metal shop. Each NYA girl is here assigned by the NYA supervisor to design, lay out, cut, and finish some article such as galvanized nail containers for the woodworking shop, waste bins for the sewing and designing shops, and galvanized iron dustpans with wire handles for use by all the shops. On the larger jobs, such as bins, drawers, baker's tables (for the cafeteria) and the reconditioning of cafeteria sinks (by putting new bodies on old frames), the supervisor will assign two or three girls to work together.

To help put their shop in working order, the first few groups of girls to be placed in the sheet-metal shop cut and treaded all the pipe and installed the booths for

This view of a part of the NYA work experience center's sheet-metal shop shows that girls are soon to take their places alongside men in factories

For the defense of her country! This young miss is on her way to becoming an expert welder

welding. They also affixed the grommets for the curtains.

In welding, the girls are given a few practice sessions with the torches before being given a real welding job. At present their real jobs consist of making complete ventilating systems for their own shop and for the cafeteria. After that, they will busy themselves in the construction of bicycle racks and small stoves for the Milwaukee County Park Board.

Other "newies" find themselves promoted to the machine shop where, besides benchwork, they become fully acquainted with the intricacies of hack saws, drill presses, lathes, air compressors, and so forth. Simple things were made at first — paperweights for various NYA project offices, for example. Later they milled and treaded 60 music-rack bases for the Wisconsin NYA Symphony Orchestra. They also made, filed, and attached the swivels for these racks.

Now the more advanced of these girls are making wrenches for use by NYA projects throughout the Milwaukee area.

Ordinarily one would not think of power sewing as a defense occupation but, if one stops to consider that both the civilian and military population of a nation must be clothed, sewing is considered in a new light. The designing shop must be considered in a like category.

In the designing shop the girls have an excellent record already. Here the designs for uniforms to be worn by NYA girl hospital attendants throughout the state originated. Originating here, too, were natty designs for the uniforms of both boy and girl members of the Wisconsin NYA Symphony Orchestra, as well as designs for NYA snow uniforms for an upstate NYA project.

To test their work, the girls grade each pattern and make a sample garment to do away with errors in appearance, proportion, accuracy, and fit.

Practically every type of power sewing machine is to be found in the sewing shop. There are heavy-duty and leather machines, glove machines, machines for light work, and special machines such as the serger, the button hole, the blindstitch, two-needle flatbed, and button sewing.

"Newies" in this shop are first given assignments on the lighter machines in order to accustom them to the speed. Their work is simple, such as the hemming of dish towels and place doilies for Wisconsin NYA resident centers. When the girls "graduate" to the leather machines, they sew only on scraps at first for leather has a different "feel" and must be handled in a far different manner than cloth. The making of "spats" for the welding shops or something equally simple is likely to be their first "major" job on these machines.

From here the girls go to the special machines and gain work experience in the completion of garments — serging, hemming, button sewing, and the like.

While some of the work consists of sewing such things as ironing-board covers, muslin table cloths, machine covers, work aprons, towels, eye patches, finger bandages, and so forth, the girls do "big jobs" enthusiastically and do them well. In this shop were made the uniforms (60 of them) for the Wisconsin NYA Symphony Orchestra and over 300 uniforms for NYA girl hospital attendants.

The only shop in the building which cannot be strictly classed in the defense occupation group is the upholstery room, but even here the youths gain important work experience. Girls engaged in this activity are reconditioning furniture for the cafeteria, covering the chairs with leatherette, and entirely refinishing the woodwork on chairs and tables. Work is also done on furniture for the Milwaukee NYA girls' resident center.

Though the center at present hums with activity, it has not yet hit its full stride. With a capacity of 400 youths, the center is nearing full operating completion as the number of workers increase from day to day. Later, the shop will stand ready to give work experience 24 hours a day, with a complement of more than 400 youths.

Still to be completed and put into operation (as this article is being written) is the completely equipped laundry. In this laundry various NYA uniforms will be cleaned and cafeteria table cloths, resident center linen, etc., will be washed and ironed.

The cafeteria is near completion and will seat and serve the entire youth personnel. NYA officials figure that hot meals, prepared by NYA girls, will cost as low as 10 cents a plate. Some of the food will be obtained from the Surplus Commodities Corporation which will greatly reduce the cost.

And so, through the farsightedness of Mayor Carl Zeidler, the Milwaukee Common Council, and NYA officials Faville and Eckers, one small part of a mighty nation stands ready to meet the approaching labor emergency.

Advertising The Evening School

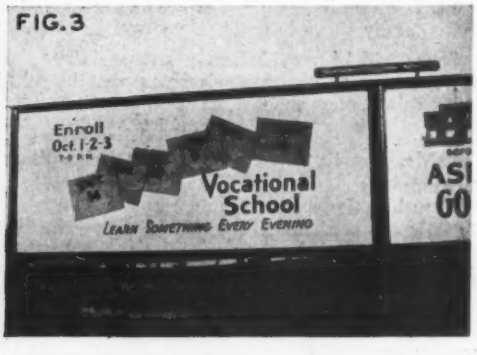
HERBERT HEILIG*

The Appleton Vocational School, Appleton, Wis., has successfully turned the classroom work of its show-card writing class into practical channels that brought results to the school through the use of outdoor advertising, and also proved again that "it pays to advertise."

During the winter months of the school year, 1938–39, the show-card writing class prepared the 24-sheet poster shown in Figure 1. This was displayed in Appleton for 30 days. The poster presented the silhouette of Abraham Lincoln with an appeal to "Go to School." It also featured Lincoln's quotations "I will study and prepare myself and some day my chance will come." Then, too, it pointed to the success which the school had achieved during the previous year, by stating that

*Past Director of the Appleton Vocational School, Appleton, Wis.

FIG. 1
Go To School
"I will study to prepare myself and some day my chance will come."
- ABRAHAM LINCOLN
EACH YEAR OVER 3000 ADULTS ATTEND
APPLETON VOCATIONAL SCHOOL



Posters produced at the Appleton Vocational School

"Each year over 3000 adults attend." The success of the poster in getting the school's story to the public could be measured by the fact that the poster was mentioned frequently, by an increased number of inquiries, and by a definitely increased enrollment.

In February of the school year 1939–40, the show-card class produced another poster as a classroom project. This showed a reproduction of the front entrance of the school and the single line of copy "Opportunities for Adults." See Figure 2. Encouraged by the success of these outdoor posters, it was decided to again use the same medium during the school year 1940–41 to tell the people of Appleton to enroll for night school. The copy theme for this campaign was "Learn Something Every Evening," with six calendar sheets reproduced on the poster to emphasize the continuity needed for any successful educational activity, and showing that night school classes were held during six consecutive months. See Figure 3. The current posters attracted a great deal of attention and were effectively and continuously telling the vocational school story to the public. One man stated that he had seen three of the school's posters from the time he had entered the city limits until he arrived at the vocational school. Traffic counts showed that the six locations used in Appleton reached over 14,000 people every day they were on display.

The successful use of outdoor advertising by the Appleton Vocational School has not only been valuable in increasing enrollment, but has added new meaning to the classroom work, since the production of the posters enabled the students of the show-card writing class to do a job at school which could be followed through exactly as is done in the business world.

Safety in the School Shops

ROY R. VAN DUZEE*

(*Continued from page 270 of the September, 1941, issue.*)

Electrical Safety Sheet
Mr. Knoblauch, Mr. Froelich, Mr. Jackson, Mr. Rose

In order to bring about a more workmanlike attitude among the shop students, and to have them appreciate the tools, materials, equipment, and opportunities that are given to you in this shop, we, your teachers, ask you to subscribe to the following rules and regulations governing this shop. Remember that most accidents are avoidable. Do your best to prevent them.

1. Always assume a workmanlike attitude in this shop.
2. Always treat all wires as live wires, until your instructor or you have made sure they are dead.
3. Have all your circuits checked before you throw in a feed switch. Remember that an a.c. meter may be wrecked on a d.c. circuit, or vice versa.
4. Do not use broken tools or equipment as they may cause damage to yourself or fellow workman.
5. Follow the *Electric Code* as strictly as possible, remembering that serious accidents may result otherwise.
6. Do not attempt any circuit or hookup unfamiliar to you, unless given permission by teacher to do so.
7. Attend strictly to your own work, and do not playfully destroy or mutilate someone else's work.
8. Remember that all equipment has been loaned to you, and that you are expected to return it in good condition.
9. More than one boy working at a lathe, grinder, or drill press at the same time, creates a hazardous situation and will not be allowed in this shop.
10. Remember to fasten all work securely in the vise, or to the press table before starting the drill.
11. Do not use the grinder without permission. Danger to the operator or machine may result from grinding in the wrong way, or the wrong kind of material.
12. Follow your instructor's advice as to the proper use of all sharp-edged tools, such as knives, chisels, and plane irons.
13. Use the right size of pliers or nippers for cutting wire.
14. Use care in handling wet cells and storage batteries. Acid burns may prove harmful to yourself or to your clothes.

Space will be provided on a separate sheet for each one of the students to sign his name, signifying that he subscribes to the foregoing safety rules and regulations.

General Woodshop Rules
Mr. Byerly, Mr. Jackson, Mr. Schoenike, Mr. Zarling

1. Students must remove coats and sweaters, roll sleeves above elbows, tuck in ties, and wear an apron.
2. Only one person shall be allowed at each bench or machine, unless given permission otherwise, by the instructor in charge.
3. Students will not be permitted to operate machines until a complete demonstration of that machine has been given by the instructor.

*Past Supervisor of Industrial Arts, now Director of Vocational and Adult Education, West Allis, Wis.

WEST ALLIS PUBLIC SCHOOLS
Industrial Arts Department

Shop ..... Hour ..... Date .....

Instructor.....

I have carefully read all of the Electrical Shop rules and regulations, and have had them explained by the instructor in charge. My conduct while in this shop will be governed by the above rules and regulations.

1.	25. .....
2.	26. .....
3.	27. .....
23.	47. .....
24.	48. .....

Signatures of students in electrical shop

a) Group instruction will be given to the entire class, followed by individual instruction.

b) Either in a group, or individually, each student will have the adjustment, care and operation of each power machine demonstrated to him before he is permitted to work on any given machine. Further, the student will have studied an instructional sheet or responded to an objective type examination on the machine to be used.

4. Any new setup shall be inspected by the instructor before the machine is started.
5. Machines must never be cleaned, adjusted, or repaired while they are in motion.
6. Guards shall not be removed from any of the machines without the consent of the instructor.
7. While working with or on keen-edged tools, the hands must always be behind the cutting edge of the tool.
8. The use of worn-out or improper tools, such as damaged hammers, cold chisels, files without handles, etc., is prohibited.
9. Permission to throw in light or power switches must be obtained from the instructor.

WEST ALLIS PUBLIC SCHOOLS
Industrial Arts Department

Shop ..... Hour ..... Date .....

Instructor.....

I have carefully read all of the General Woodshop rules and regulations, and have had them explained by the instructor in charge. My conduct while in this shop will be governed by the above rules and regulations.

1.	25. .....
2.	26. .....
3.	27. .....

Signatures of students in general woodshop

Variety-Saw General Safety Rules
Mr. Byerly, Mr. Jackson, Mr. Schoenike, Mr. Zarling

1. Before ripping see that the rolling table is locked.
2. When using the ripping fence as a stop always provide for clearance between the saw and ripping fence. Use the clearance block as shown in Figure 1.

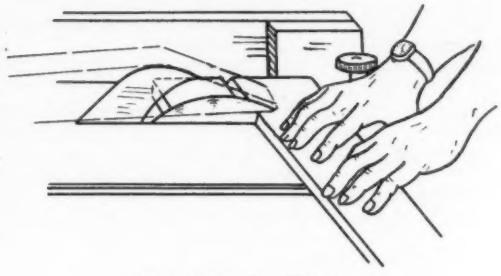


Fig. 1. Using the variety saw

3. Have only ⅛ to ¼ in. of saw above the work.
4. Have the splitter in place over the saw.
5. Stand to right or left of the piece being ripped.
6. Do not remove the guard without permission from the teacher in charge.
7. Do not attempt to remove small pieces from near the saw while it is running.
8. Always use a fillister strip for narrow work so that the guard may be in place. See Figure 2.

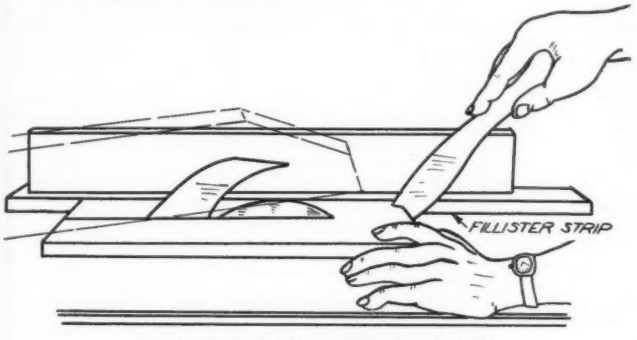


Fig. 2. Using fillister strip and push stick

9. Always use a push stick when ripping narrow stock. See Figure 2.
10. Have any new setup inspected by the instructor before starting the machine.
11. Keep some part of the hand in contact with a stationary metal part of the machine when working near the saw.
12. *Observe all general shop rules at all times.*

Jointer Safety Instructions
Mr. Byerly, Mr. Jackson, Mr. Schoenike, Mr. Zarling

1. Run no stock shorter than 10 in. over this machine.
2. Cut stock on edge or surface only. Cutting end grain is very dangerous.
3. Be sure the guard is in place and in working order before starting the machine.
4. If the fence is set to expose any of the cutter head behind it, cover this part of the cutter before using the jointer.

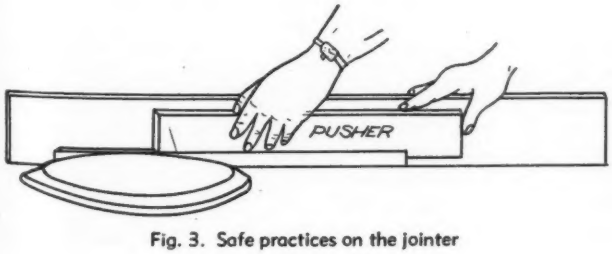


Fig. 3. Safe practices on the jointer

5. While operating the machine, always keep the wood being cut between the hands and the knife edge.
6. For thin or narrow stock use a pusher. See Figure 3.
7. *Cut off power* at main switch box whenever it is necessary to work on cutter or cutter head.
8. *Cut off power* when setting the fence.
9. Group and individual instruction and demonstration are required before anyone is allowed to operate this machine.
10. If it is necessary to plane the surface of a short piece of stock, use wood mitten as shown in Figure 4.

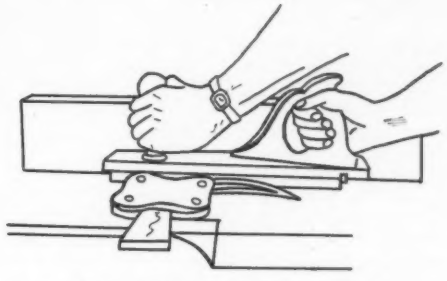


Fig. 4. Using the wood mitten on the jointer

11. Use both hands in pushing the stock across. Stock may be thrown out of one hand by sudden striking of *knives*.
12. Keep fingers away from knives on jointer at all times. See Figure 5.

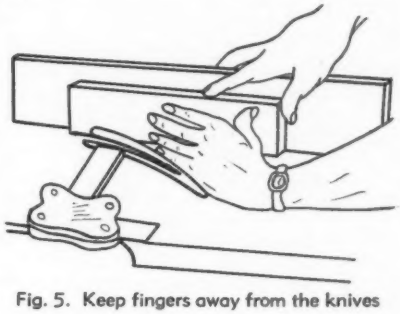


Fig. 5. Keep fingers away from the knives

13. Keep some part of the hand in contact with stationary part of machine, to serve as a brake.
14. *Observe all general shop rules at all times.*

Jig-Saw Safety Instructions
Mr. Byerly, Mr. Jackson, Mr. Schoenike, Mr. Zarling

1. Oil the machine before starting.
2. Hold the stock firmly on the table.

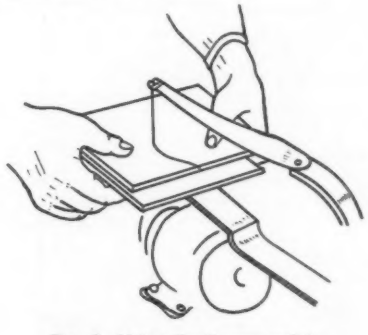


Fig. 6. Using the jig saw safely

3. Stand erect when operating the jig saw. If the head is directly over saw, an injury may result.
4. Keep eyes on work at all times when operating machine.
5. Keep some part of the hand or hands in contact with the stationary part of the machine at all times. See Figure 6.
6. *Observe all general woodshop rules at all times.*

Problems and Projects

JIG-SAW DETAILS

Frank E. Anthony,
Instructor, Technical High School, Erie, Pa.

(See assembly on pages 390 and 391; also two sheets of details in the December, and two in the January issues.)

The jig saw illustrated and described in this article was designed by a group of first-year trade drafting students. Although the objectives involved are not new for drafting practice, yet the jig saw will be of interest to all drafting students. The problem also shows how various types of material are used on such a machine as a jig saw. Through the study of this material, the instructor can easily develop student interest. As the work of assembling and detailing progresses, the student should be informed that he is following the same procedure which is used in industrial drafting rooms.

The bill of materials shows the various items that must be purchased, and the different kinds of materials that are used. The rubber hose, for instance, is used for the blower. As shown in the assembly drawing, it is clamped to the nipple, then bent downward and brought back alongside the guide rod, after which it is bent again, and then fastened to a clamp which has been riveted to the saw guide. The upper rod is greased through a Zerk fitting. A lock washer is used with the nut on the drive shaft. The pipe plug is used to drain the oil. The table, 9 by 9 in., can be tilted, side to side, for cutting bevels. The ⅛-in. holes in the upper and lower rods are to take care of extra long saw blades. The mechanism runs in a bath of oil.

CODE PRACTICE KEY AND BUZZER

Harold L. Noakes,
High School, Moravia, N. Y.

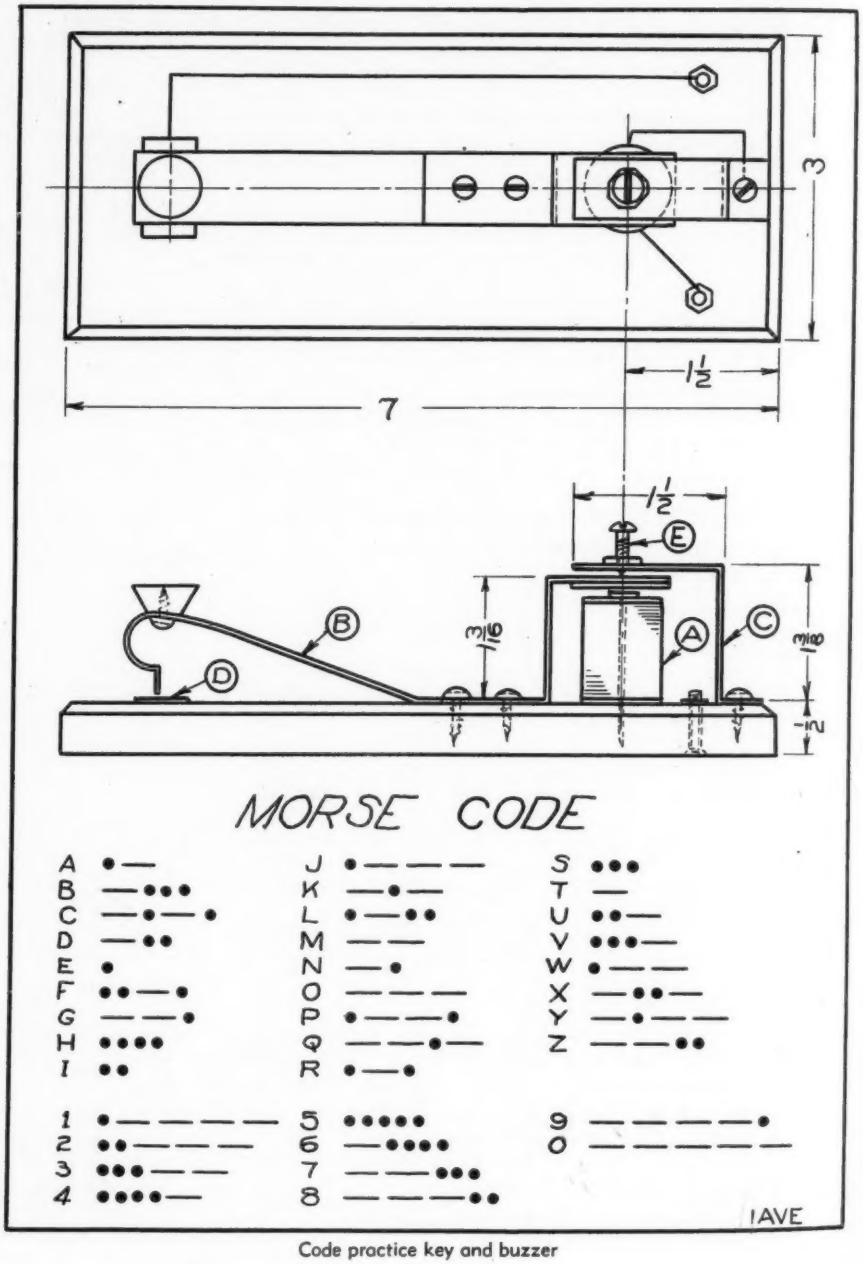
The practice key and buzzer described herewith makes an excellent project for either seventh- or eighth-grade electricity. Many of the boys in these grades are interested in scouting or amateur radio and, therefore, will find this project of particular value to them. The materials are inexpensive and the construction is not difficult.

Bill of Materials

Base	1 pc., 3 x 7 x ½ in.	White pine
Part *C*	1 pc., ⅝ x 3½ in.	Heavy brass or gal. iron
Key and Buzzer *B*	1 pc., ¾ x 8 in.	20 ga. gal. iron
Coil Ends	2 pc., ¾ in.	Fiber or cardboard washers
Coil Core	1 pc., 16d	Common nail
Coil Winding	25 ft. 20 ga.	d.c.c. copper wire
Binding Posts	2 pc., 6/32 x 1 in.	Flathead machine screws with nuts
Adjusting Screw *E*	1 pc., 6/32 x ½ in.	Roundhead machine screw with nut
	4 pc., ⅜ in.	Roundhead wood screws
Contact *D*	1 pc., ½ x 1 in.	Brass

Procedure:

1. Cut piece of white pine for base.
2. Lay out and cut a ⅛-in. chamfer around top edge of base.
3. Construct coil as follows:
   a) Cut nail 1½ in. from head.
   b) Drill a hole in center of washers slightly smaller than nail.
   c) Place washers on nail 1 in. apart, with one washer tight against the head of nail.
   d) Wind nail between washers with a strip of paper.
   e) Shellac coil form and allow to dry.
   f) Wind coil neatly with d.c.c. wire leaving several inches at each end for wiring.
4. Drill hole in base slightly smaller than nail and tap coil into place.
5. Bend key and buzzer out of one piece of galvanized iron, making sure that buzzer is double in thickness.
6. Mount key and buzzer on base, and fasten with wood screws.
7. Bend brass strip *C* to shape. Drill hole for adjusting screw and solder nut over hole. Fasten to base.
8. Wire as follows:
   a) Run a wire from one binding post to contact D soldering connections.



Code practice key and buzzer

b) Solder one lead from coil to brass strip *C*.
c) Solder other coil lead to other binding post.

9. Connect to any source of power not over 12 volts, press key and adjust screw *E* until the desired pitch of the buzzer is obtained.

REBUILDING DRY CELLS

E. A. Rerucha,
Franklin Park, Ill.

Old and worn-out dry cells may be rebuilt to give excellent service for experimenting.

Remove the paper case on the outside. With a hack saw cut the cell to the carbon, vertically and across the bottom, as shown in Figure 1. Remove the sealing wax at the

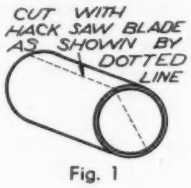


Fig. 1

top and spread the case open. Then remove the carbon rod and the black materials surrounding it. Flatten out the zinc case and scrape off all paper and black material. Soaking in water will help. Save all the black material, zinc, and the carbon rod.

Cut the zinc in pieces about 2 by 3 in. with a pair of tin snips or an old pair of scissors. Stack on top of each other and punch a hole in the center of the pile with

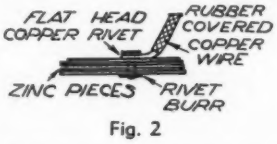


Fig. 2

a 10d nail. Fasten the pieces of zinc together to a piece of rubber-covered copper house wire with a flathead copper rivet and burr, as shown in Figure 2. Scrape the insulation from the end of the wire before riveting to the zinc.

Crush the black material removed from the cell on an old newspaper and mix with a little water to make a moist paste. Do not add too much water. Make a cardboard cylinder 2 in. in diameter and 4 in. high by

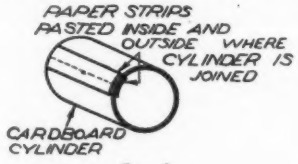


Fig. 3

pasting together the ends of a piece of light cardboard 4 by 6⅜ in., with strips of thick wrapping paper, on both the inside and outside of the cylinder. Figure 3 shows how this is to be done.

Stand the cylinder upright on a piece of paper on the table and, holding the carbon vertically in the center of the cylinder with the end on the table, tamp the black paste around the carbon rod with a stick. Wrap with two layers of cloth 8 in. wide and tie the ends securely with string. See Figure 4.

A tin can, 4 by 5½ in., is used for the container. Coat the inside of the can with paraffin. This may be done by pouring molten paraffin into the can and inclining and revolving the can so that the entire inside surface of the can is thoroughly covered. Be careful not to damage this coating when placing the parts in the container.

Fig. 4

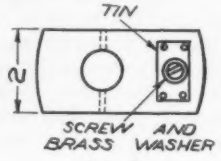


Fig. 5

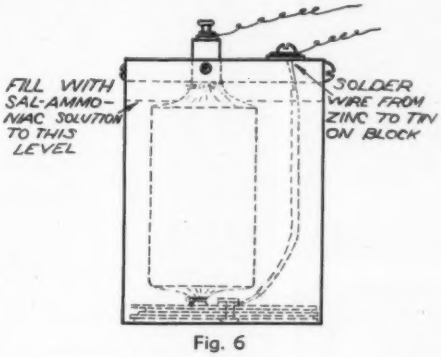


Fig. 6

Prepare a block of wood 2 in. wide and long enough to fit inside the can. About ¾ in. from the middle drill a hole for the carbon rod to pass through. Drill, or with a nail make small pilot holes for screws as shown by the dotted lines in Figure 5. Nail a piece of tin 1 by 1½ in. near the other end of the block. Make a small hole for a screw in the center of the piece of tin, and screw, partly in and over a small brass washer, a round-head screw ¾ in. long. This serves as the other terminal of the cell.

Solder the rubber-covered wire from the zinc pile to the piece of tin on the wood block. Place the carbon rod through the hole in the block from the bottom so that about ½ in. of it projects above and clamp in place with two screws through the pilot holes in the sides of the block. These screws should be no longer than necessary so that they do not touch the can when the block is in place.

Assemble the parts in the can as shown in Figure 6. Fasten the wood block with round-head screws through the sides of the can. The zinc or the copper wire should not touch the carbon rod at any place.

Dissolve about four tablespoonfuls of sal ammoniac in a pint of water and fill the container to the level of the top of the cardboard cylinder and the cell is ready for use.

When the zinc is all used up, another element may be prepared from the zinc taken from other old cells or any piece of zinc. If the cell does not deliver reasonable current at first, more sal ammoniac may be added. Water evaporated should be replaced from time to time.

LEAD-CAST THREADS FOR METAL-SPINNING CHUCKS

Earl E. Smith,
James E. Reagan,
John Adams High School,
Cleveland, Ohio

This method of making threads in the base of metal-spinning chucks has been used with satisfactory results for several years. It has the virtue of eliminating the necessity of screwing each chuck to an individual face-plate, or the rather tedious and time-consuming operation of cutting threads in the base of the chuck with a thread chaser. It has the advantage of being easily and quickly done by the metal-spinning student.

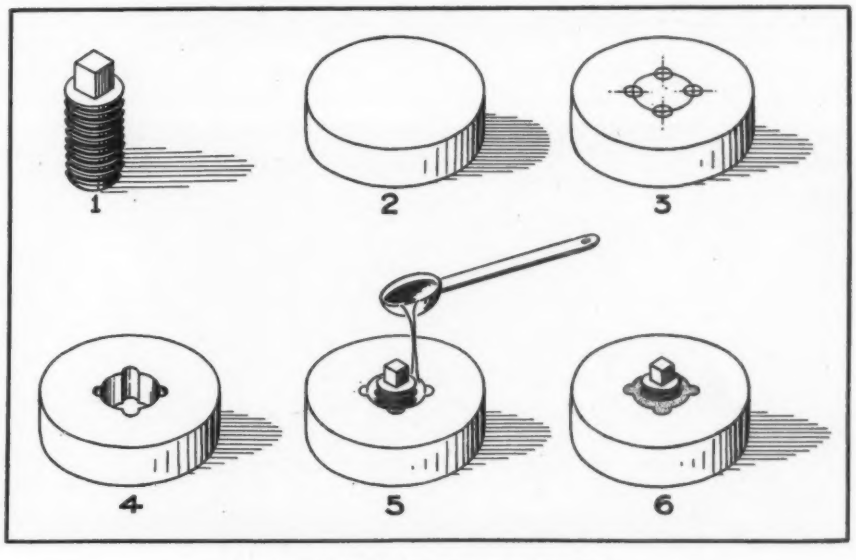
Procedure:

1. First turn on an engine lathe a plug about 3 in. long, and 1/32 in. greater than the outside diameter of the spindle of the lathe. Then cut threads on this plug of the same pitch as that used on the spindle.

2. Square the end of this plug so that it may be turned with a wrench.

3. Take the blank to be used for the chuck base and bore four ⅜-in. holes through it, spacing the centers equidistant on the circumference of a circle ½ in. larger in diameter than the lathe spindle.

4. Next, remove the wood from the center of the blank using an expansion bit set to a diameter ½ in. larger than the spindle of the lathe.



Lead-cast threads for metal spinning chuck

5. Set the block level on a sand base or clamp down on a wood block.

6. Set plug in hole being careful to center carefully. Clamp solid so that molten metal will not move it out of place. Pour lead around plug to surface of blank.

7. Let cool and remove plug with wrench.

8. The threads will be clean cut. Heating the plug for the first few blanks threaded will assist in getting clean-cut threads. The excess lead on the surface of the chuck may be faced down on either a wood or engine lathe. This operation adds to the neatness of the finished chuck.

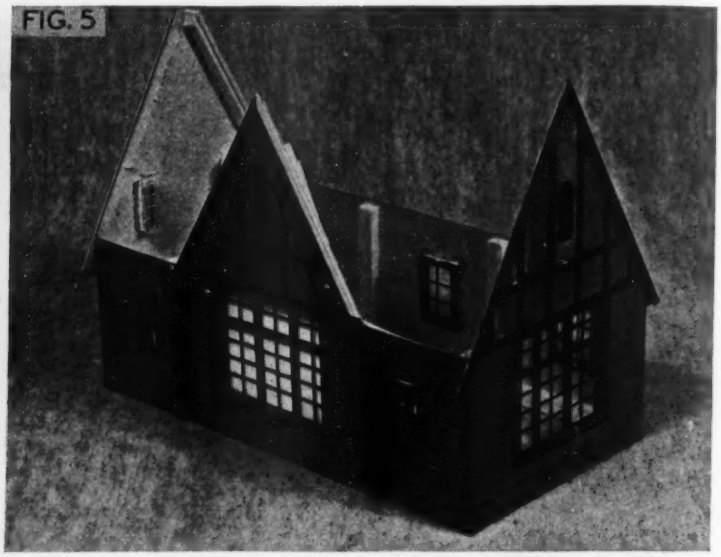
ARCHITECTURAL MODELS

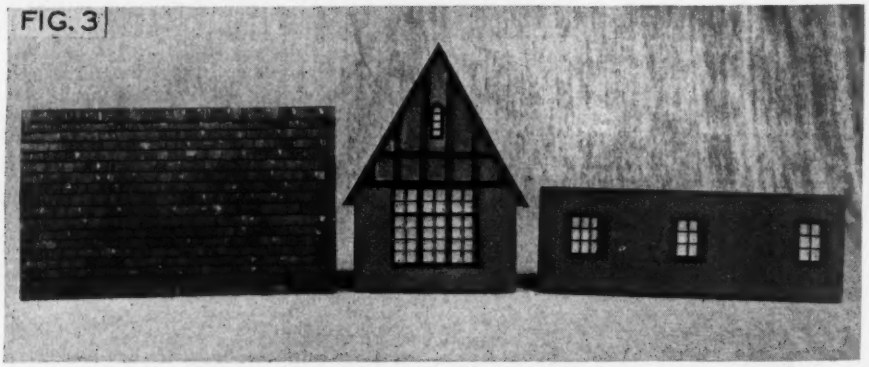
G. A. Jester,
Milwaukee Vocational School, Milwaukee, Wis.

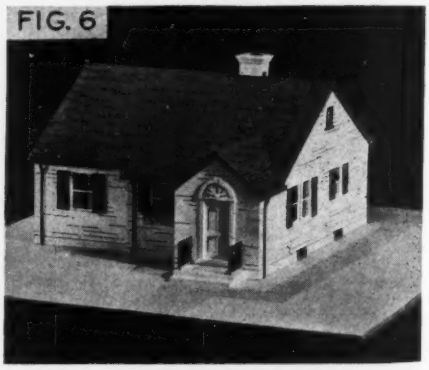
A previous article, also entitled "Architectural Models," which appeared on page 340 of the October, 1940, issue of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, discussed models made with a number of mediums and then showed what had been done with balsa wood, cardboard, and printed material. The materials discussed in that article, while suitable for the beginner, do not test the skill of the more advanced student.

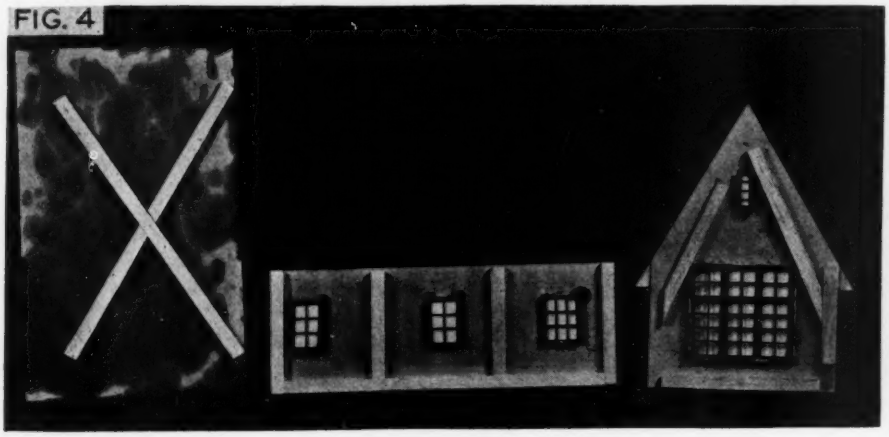
While the same mediums described in that article were used in the models shown in Figures 1 and 2, the reader will note that the addition of the garage, the tree, and the flowers give an almost lifelike setting to the model. The second floor of this early American home had an overhang of 18 in. The four brackets for the overhang were made with balsa wood and

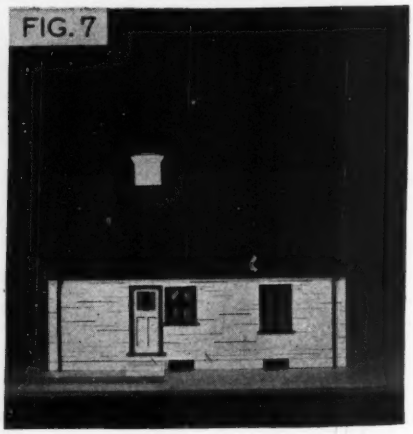
(Continued on page 393)







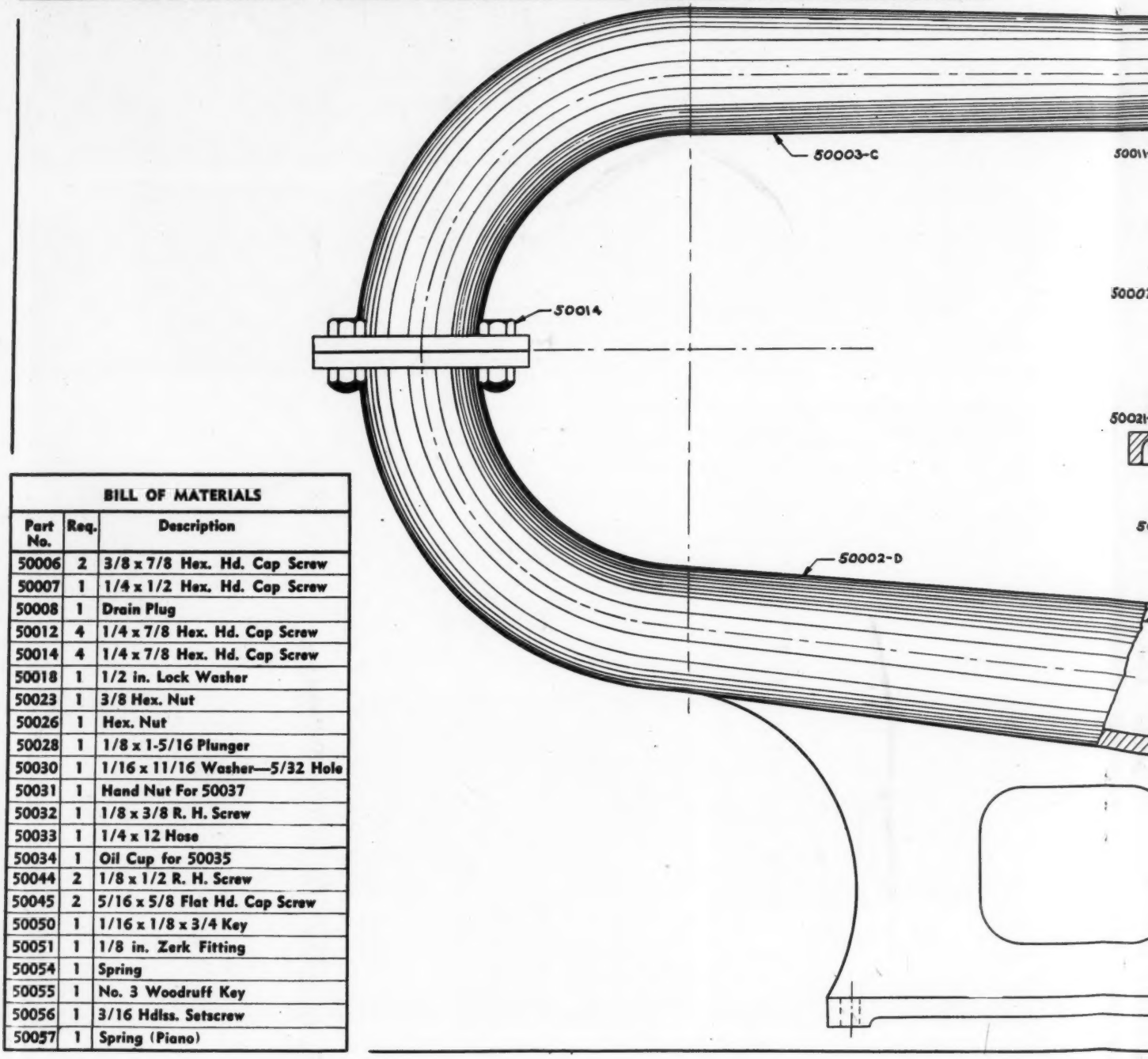




Architectural models

BILL OF MATERIALS

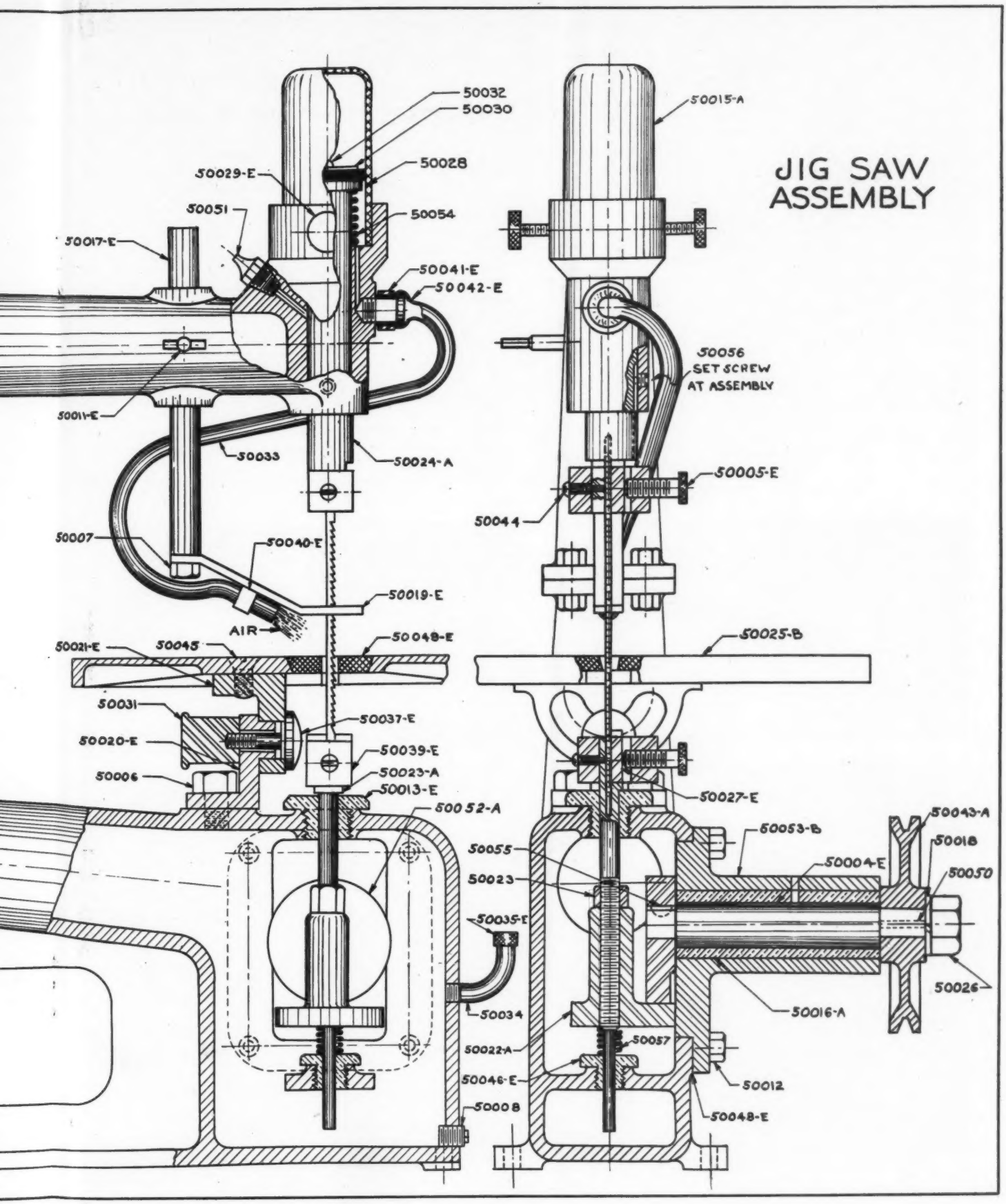
Part No.	Req.	Mat.	Name
50002-D	1	C.I.	Lower Frame
50003-C	1	C.I.	Upper Frame
50004-A	1	M.S.	Shaft
50005-E	2	M.S.	Thumbscrew
50011-E	1	M.S.	Thumbscrew
50013-E	1	Bz.	Bushing
50015-A	1	Alm.	Tube
50016-A	2	Bz.	Bushing
50017-E	1	C.R.S.	Guide Rod
50019-E	1	S.S.	Guide
50020-E	1	C.I.	Arc Bracket
50021-E	1	C.I.	Fence
50022-A	1	M.S.	Lower Rod Guide
50023-A	1	M.S.	Lower Rod
50024-A	1	M.S.	Upper Rod
50025-B	1	C.I.	Table
50027-E	2	M.S.	Chuck Jaw
50029-E	2	M.S.	Thumbscrew
50035-E	1	M.S.	Oil Cup
50037-E	1	M.S.	Bolt
50039-E	2	M.S.	Chuck
50040-E	1	S.S.	Clamp For Air Hose
50041-E	1	S.S.	Clamp For Air Hose
50042-E	1	Bz.	Nipple For Jig Saw
50043-A	1	C.I.	Pulley
50046-E	1	Bz.	Bushing For Jig Saw
50048-E	1	Cd. Bd.	Gasket
50049-E	1	Lead	Plug
50052-A	1	M.S.	Cam
50053-B	1	C.I.	End Plate For Jig Saw



BILL OF MATERIALS

Part No.	Req.	Description
50006	2	3/8 x 7/8 Hex. Hd. Cap Screw
50007	1	1/4 x 1/2 Hex. Hd. Cap Screw
50008	1	Drain Plug
50012	4	1/4 x 7/8 Hex. Hd. Cap Screw
50014	4	1/4 x 7/8 Hex. Hd. Cap Screw
50018	1	1/2 in. Lock Washer
50023	1	3/8 Hex. Nut
50026	1	Hex. Nut
50028	1	1/8 x 1-5/16 Plunger
50030	1	1/16 x 11/16 Washer—5/32 Hole
50031	1	Hand Nut For 50037
50032	1	1/8 x 3/8 R. H. Screw
50033	1	1/4 x 12 Hose
50034	1	Oil Cup for 50035
50044	2	1/8 x 1/2 R. H. Screw
50045	2	5/16 x 5/8 Flat Hd. Cap Screw
50050	1	1/16 x 1/8 x 3/4 Key
50051	1	1/8 in. Zerk Fitting
50054	1	Spring
50055	1	No. 3 Woodruff Key
50056	1	3/16 Hdlss. Setscrew
50057	1	Spring (Piano)

Jig-Saw assembly by Frank E. Anthony, instructor, Technical High



, Technical High School, Erie, Pa. For description see page 386

ARCHITECTURAL MODELS

(Continued from page 388)

map pins. The bushes and hedges were all made of sponge rubber. The tree which stands in the back yard was made of armature wire and sponge rubber.

Since much of what we learn and retain is obtained through observation, the writer thought it wise to use more illustrations and a minimum of printed explanation in this article, in order that the points that ought to be stressed, would receive proper emphasis.

Figures 3, 4, and 5 show how cardboard, balsa wood, and sandpaper were used to imitate stucco and wood in English half timber construction. In this model the doors and windows were set in the walls. It is needless to say that this gives a much more realistic appearance to the model than when the doors and windows are applied directly to the face of the walls.

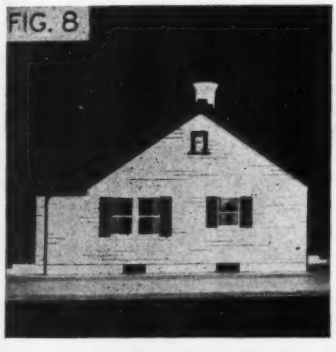
On the model shown in Figure 3, each shingle was cut and fitted separately. It takes a tremendous amount of time and unlimited patience to do this but the effect is very realistic.

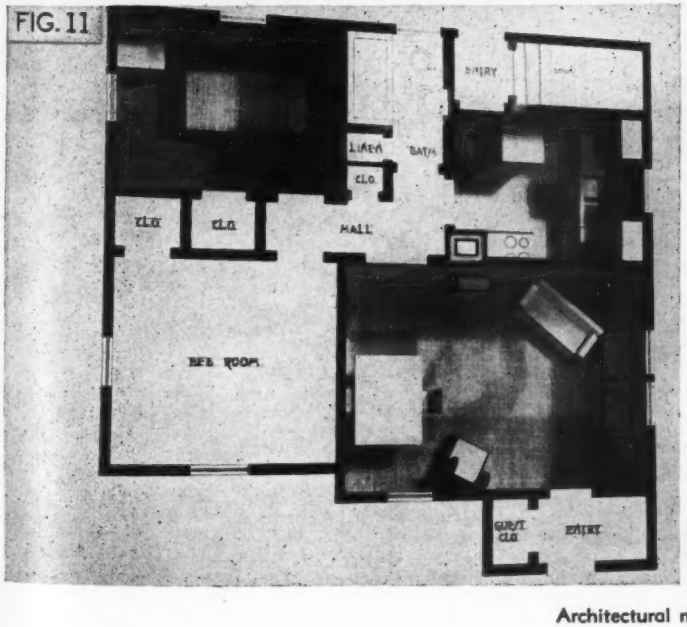
Figure 4 shows how the side walls and roof were reinforced on the back. Figure 5 shows a partial assembly of the model. It was not possible to secure a photograph of the completed project because the student who made this particular model secured a job in industry and dropped out of the vocational school. When this happens, the boys are permitted to take home the models they have made.

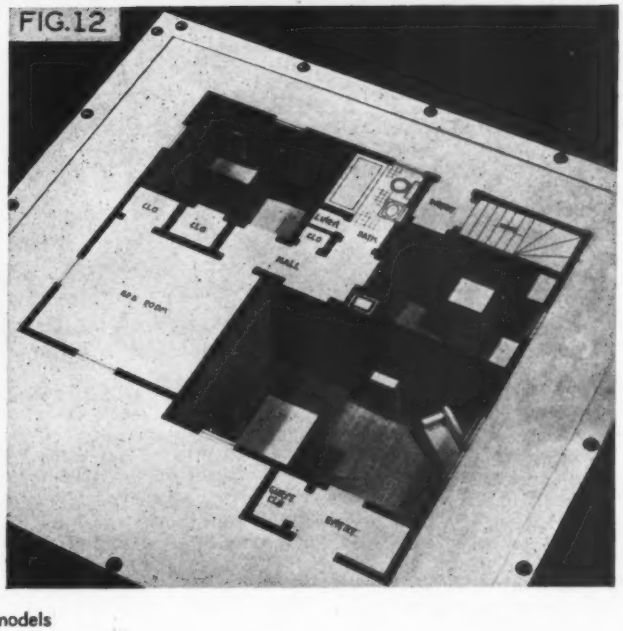
Figures 6 to 10 inclusive illustrate a project made by one of the students this past year. The model was made to a scale of ¼ in. to the foot. Illustration board was the medium used. Celluloid was used for the windows, and this with cloth curtains that were made, gives a most realistic appearance to the model. Figure 10 shows what the addition of trees, hedges, and the walks will do to add that realistic touch. It might be mentioned in passing, that the work done by the young man making this model was of such a character that it helped him secure a position with a large Milwaukee manufacturing concern this past summer.

Figures 11 and 12 show a cutout model. This model was made on illustration board at a scale of ½ in. to the foot. Three rooms were then cut out of the plan; the kitchen, a bedroom, and the combination living and dining room. The walls were covered with wallpaper, and the doors and windows were put on afterward. The walls were then inserted and fastened in place with airplane cement. All of the floors were covered with wallpaper to simulate either carpeting or linoleum. The next job was the placement of furniture and cabinets. These were also made of illustration board. Anyone familiar with architectural work will find much to be desired in this floor plan. It is the plan of the house shown in Figure 6, and was used because of its simple arrangement. The beginner will find it quite a challenge to his abilities. After finishing a model, it is advisable to cover it with airplane dope, so that it will not soil so easily and can be brushed off occasionally when dusty. Any boy who has done model airplane work will find that model house building permits him to apply many of the things that he has learned in his airplane work.

Models made in the drafting room are often found useful in other classes of the school. Social science classes in discussing housing, or classes in homemaking, for instance, will be glad to get them. The cost of the materials used in this kind of work is negligible.







Architectural models

Whittling-Jackknife Technique

W. BEN HUNT
Hales Corners, Wis

(*Continued from page 351 of the October, 1941, issue*)

The article in last month's issue showed how to handle a jackknife. This, however, is but a part of the knowledge which a whittler must possess, for he must also know which way the wood is to be cut. Cutting with the grain is easier than cutting against it, but a sharp knife will cut either way. Before trying to whittle intricate projects it may be well to get accustomed to the knife and the wood by cutting out some helices, commonly called spirals. 1⅛ to 1½-in. diameter stock will be suitable for this purpose.

Laying Out Spirals

First and easiest is the single spiral or corkscrew, and the simplest method of laying it out on the stick is with a long narrow strip

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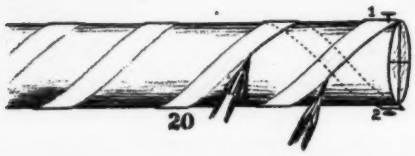

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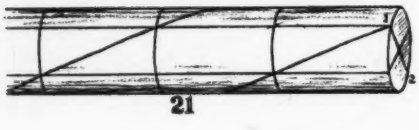

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of paper. The paper should be of an even width, and if the stick is a perfect cylinder, it will space itself evenly as shown in Figure 18. Fasten the ends with a pin or tack, then mark out the spiral with a pencil. Figure 19 shows how a piece of wire, the coils of which have been carefully spaced with a rule, may be used in laying out a spiral.

To lay out a double spiral, use a paper strip as shown in Figure 20, or it may be layed out as shown in Figure 21. For a 1⅛-in. diameter stick, the crosslines shown in the drawing should be 1½ in. apart. Mark with a pencil.

For laying out an open spiral, the same method is used as for the double spiral. See Figure 20.

If the outer edges of the spirals are to be sharp, only one line is required. But if the edges are to be cut to a certain thickness, a second line should be drawn, running parallel to the one marked first, and about

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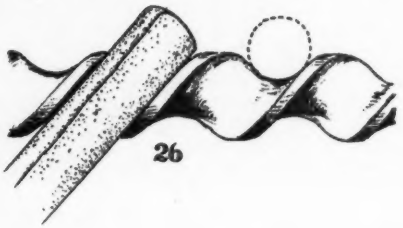
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⅛ in. from it. Figure 22 shows how the stick should look, marked for a single spiral.

Whittling Spirals

To start whittling, the easiest method is cutting a shallow V cut going the full length of the stick. If a double spiral is to be cut, whittle two cuts. Do not cut right up to the pencil lines. See Figure 23. Hold the knife as shown in Figure 11 in the article which appeared in the October issue.

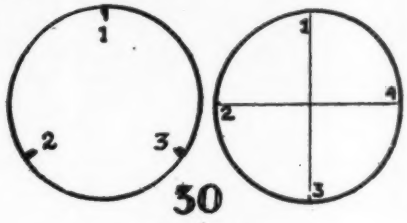
Then, using the methods shown in Figures 12, 13, and 14, in that same article, whittle until the spiral looks like Figures 24 and 25. Cut right up to the pencil lines and keep the ridge even.

Whittle first one side and then the other, ending the cut at the *bottom* where the grain

28

is straight. If a smooth finished spiral is wanted, finish with sandpaper wrapped around a round stick as shown in Figure 26.

Figure 26 shows a peace-pipe stem made with a double spiral. On this pipe the spiral has a twist running from left to right. This is as easy to whittle as one that twists in the opposite direction.



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Open Spiral

When whittling an open spiral like the one shown in Figures 28 and 29, cut the same as the double spiral, the full length of both grooves. Then take a second cut, cutting the sides steeper; perhaps a third V cut will be required before the V cuts meet in the center of the stick. From now on a little care must be taken and the grain must be matched. Hold the stick and knife, as shown in Figure 28, to cut away the surplus core, and cut down the full length as shown, and then change ends and cut down on the other side.

Figure 29 shows an open spiral cut from a basswood limb. This was used for a rattle handle. While only single and double spirals are shown and described in this article, triple or quadruple spirals may also be cut. To lay out such spirals, simply divide the end of the stick into 3 or 4 parts, as shown in Figure 30, then proceed in the same manner as was described for laying out single and double spirals.

Spirals may be cut deep or shallow depending on what they are to be used for. The deeper cut spirals have more grace while the shallow cut spirals have more strength. Whittling spirals is fun once the art has been mastered, and they can be incorporated and used for a great many things in the furniture line.

LABORATORY EQUIPMENT FOR AUTO-ELECTRICAL WORK

Linder S. Wood,
Bloomington, Ill.

Several units of equipment similar to the one pictured in Figure 1, designed and built under the direction of Mr. O. F. Tramontine, are now in use in the Bloomington, Ill., high school. They have helped solve the problem of providing laboratory work for two classes beginning the study of automobile electricity in a shop with limited floor space.

Fig. 1

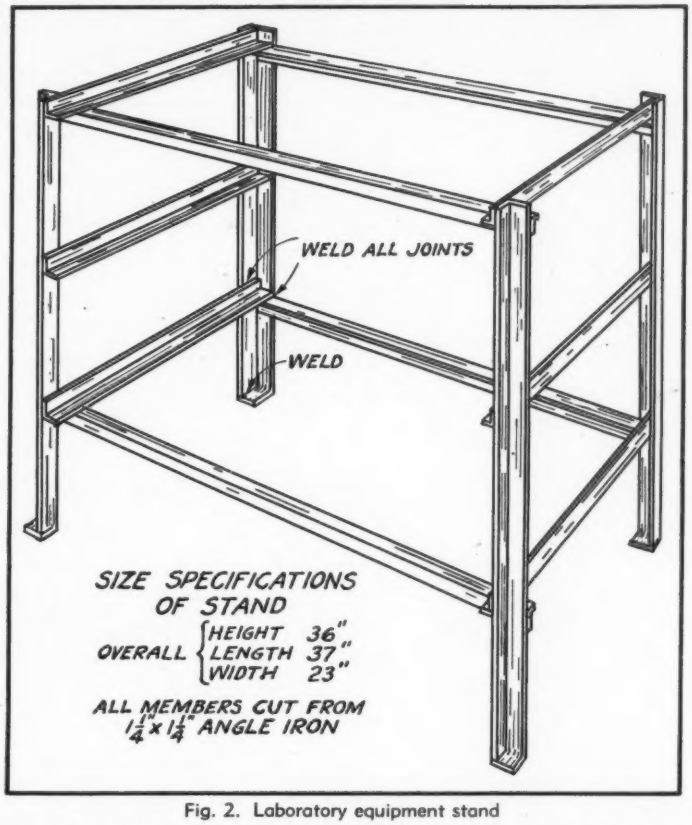


Fig. 2. Laboratory equipment stand

Before using this equipment the classes study and test independently each of the electrical units from a number of different cars.

The units shown in Figure 1 are mounted upon panels made of wood and covered with sheet metal. At either end of each panel a strip of angle iron is securely fastened. These strengthen the panel and provide smooth sliding surfaces when a panel is being removed or placed in position in the angle-iron stand. Also, they insure a good electrical contact between the panel and the framework of the stand.

When a panel is in position on the top of the stand, and with battery attached as shown, a grounded circuit is completed through the metal covering of the panel and framework of the stand to the battery. The ground post of the battery is connected to the stand through a knife switch mounted on a block of wood which is bolted to the stand as shown.

Each panel provides laboratory work for two or more students. When a panel is not in use it is removed from the top and stored in one of the lower sections of the stand. The panel shown in the bottom section is left without mountings, so that it may be used on the top of the stand to form a convenient table. This panel, of course, also may be equipped when additional layouts of electrical units are needed.

Upon the mounted panels the complete electrical equipment of several different makes of cars are arranged. These layouts enable the student to gain experience in wiring the many automotive electrical circuits and in operating the various electrical units. Through this procedure he sums up the relationship between the various independent units previously studied. Student groups are rotated to cover work on several panels. Figure 2 shows how the stand is constructed.

The advantages of this type of equipment are:

a) Laboratory work on separate groups of electrical units may be provided for each class.

b) The amount of floor space for laboratory work is greatly reduced since each equipment stand may provide work for a group of students from each of three different classes.

c) Grounding circuits through the equipment stand gives the student practice on the type of circuit he will later find when working on the electrical equipment of the automobile.

A STOCK-BILL FORMULA

Homer C. Rose,
Southern Illinois State Normal School, Carbondale, Ill.

Out of a dozen or more ways of estimating the value of a piece of stock the following formula has proved most adaptable.

It may be used for any kind of material such as wood, metal, or cloth, and any thickness, width, or length. No unnecessary figures are used, and it is not necessary to change from square feet to board feet to arrive at the proper answer.

$$\text{COST OF STOCK} = \frac{\text{NO. OF PCS. OF ONE SIZE} \times \text{COST PER SQ. FT. OF THIS THICKNESS} \times \text{WIDTH IN INCHES} \times \text{LENGTH IN INCHES}}{144} = \text{COST}$$

This blank formula may be duplicated and several copies given to each student to provide an exact form on which to estimate the cost of the material which he uses for his project.

A NEW HARDENING PROCESS

Heating time for hardening crankshafts has been cut from 12 hours to less than 5 minutes by 2000-cycle inductive heating at the Chicago tractor plant of the International Harvester Co.

Formerly the drop-forged shafts were normalized, hardened and drawn, pickled or shot blasted to remove scale, then machined and ground. Though durability of main bearings and connecting-rod bearings is almost directly dependent upon their hardness, this physical property was limited by machining operations after hardening. Carburizing these particular shafts was not a practical means of increasing hardness, because distorted shafts could not be satisfactorily straightened afterward. Final hardness was between 25 and

30 Rockwell C. Shafts are now normalized, completely machined except for final finish, then heat-treated on the searing surfaces only to a hardness of from 55 to 62 Rockwell C, drawn at 350 deg. F., and ground. Pickling is no longer necessary, since inductive heating introduces no scale. Using conventional hardening methods, shafts previously were made of a nickel-alloy steel of the 3100 series, which has been made currently almost unavailable by defense restrictions. With inductive heating the more costly nickel steel has been replaced by a readily available carbon-chrome steel. Total rejections for metallurgical defects have been cut from the previous 5 per cent to an average of less than 1 per cent, and more than 2 million shafts have been produced without rejection for incorrect hardness.

A TOOLROOM REPORT

Howard C. Nelson,

High School,
Monmouth, Ill.

A toolroom report for a tool checking system that has proved to be very satisfactory in the writer's shop classes is shown in the accompanying illustration.

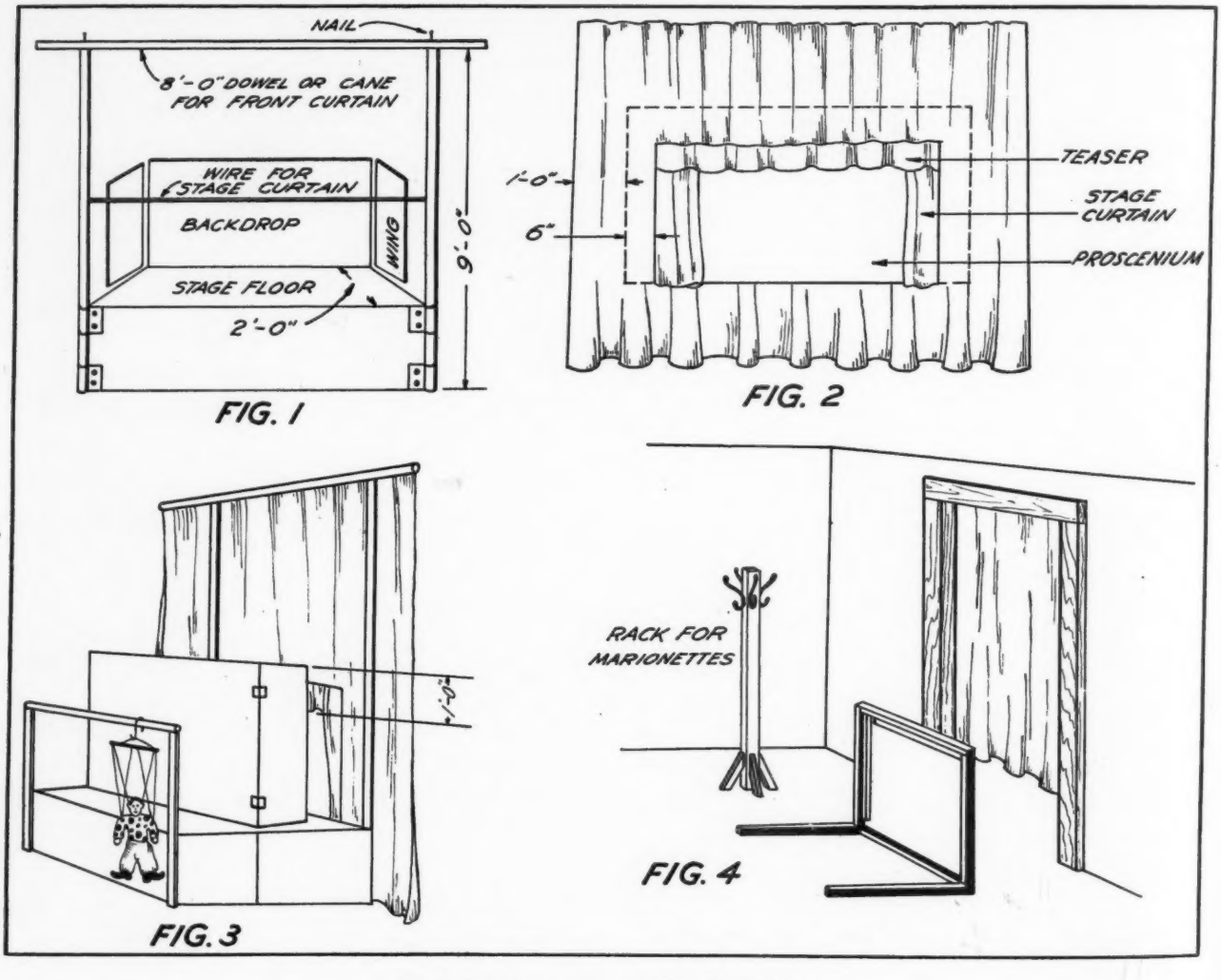
The tool clerk for each class fills out a report each day for the tools which are checked from the toolroom. Each student is assigned a number which he uses in checking out his tools.

When a student in the woodwork shop checks out a set of tools (jack plane, backsaw, marking gauge, try square, and three chisels), a circle is placed after his number and under the word *Set* on the report. When

TOOL ROOM REPORT
INDUSTRIAL ARTS SHOP

Tool Clerk _____ Date _____ Period _____

No.	Set	List all other tools here
1		
2		
3		
4		
5		
6		
22		
23		
24		
25		



Detail of marionette stage by Helen M. Douglas

the set is returned, an *X* is written in the circle.

When a tool such as a screw driver or framing square is checked out, the tool clerk writes the name of the tool in one of the spaces after the student's number. When the tool is returned, he places an *X* in the space preceding the name of the tool.

This checking system has several advantages:

1. A permanent record is made of all tools taken from and returned to the toolroom.
2. Any tool in the shop may be located immediately by referring to the tool-clerk's record.
3. Students are required to name the tools, and the tool clerk is required to write these names when the tools are checked from the toolroom.
4. It is not difficult to require that all tools be returned to the toolroom at the end of the period.
5. It requires a minimum amount of the teacher's and student's time. The tool clerk may work at a bench in the toolroom when he is not occupied with checking tools.
6. The system is simple and not difficult for the students to learn.
7. It places a responsibility upon every student to assist in keeping all of the tools in their proper places.

THE MARIONETTE STAGE

Helen M. Douglas,
Commerce, Tex.

Every actor or performer needs a stage upon which he can act. This is also true of the marionette, since the stage helps to make the illusion more fascinating. There are many ways, expensive and inexpensive, of making a stage.

To make your stage you should know the meanings of stage terms that are used by puppeteers, such as, proscenium, backdrop, bridge, teaser, stage curtain, wings, marionette rack, and cyclorama. See Figures 1, 2, and 3. The cyclorama, or cyc as it is often called, is a curved backdrop. As a rule, it is sky blue in color. The backdrop is usually dark so that the strings will not stand out.

The stage should be 6 ft. long and not more than 2 ft. wide. Use a 7-ft. stage if there are several operators. A stage that is more than 24 in. deep makes it difficult for the operator to use his marionettes to the best advantage. The proscenium should be 30 in. high for an 18-in. marionette figure — higher for taller marionettes. It is necessary that the front curtain be wide enough and tall enough — the top rail should be higher than the tallest marionettist — to hide all of the operators and their equipment. A towering head above the front curtain is sure to be distracting.

If the stage is to be used in a room, the stage floor should be 36 in. from the floor — 18 in. if used on an auditorium stage.

The top rail of the backdrop should be below the armpits of the smallest operator, and at the same time, it must be taller than the height of the top of the teaser. This is to keep the front row of your audience from seeing part of your body and hands as you make your little actors perform. See Figures 2 and 3. It may be necessary for the bridge floor to be 6 to 12 in. above the level of the stage floor, depending upon the height of the smallest operator.

A very simple stage may be made by using a convenient doorway, a card table, some

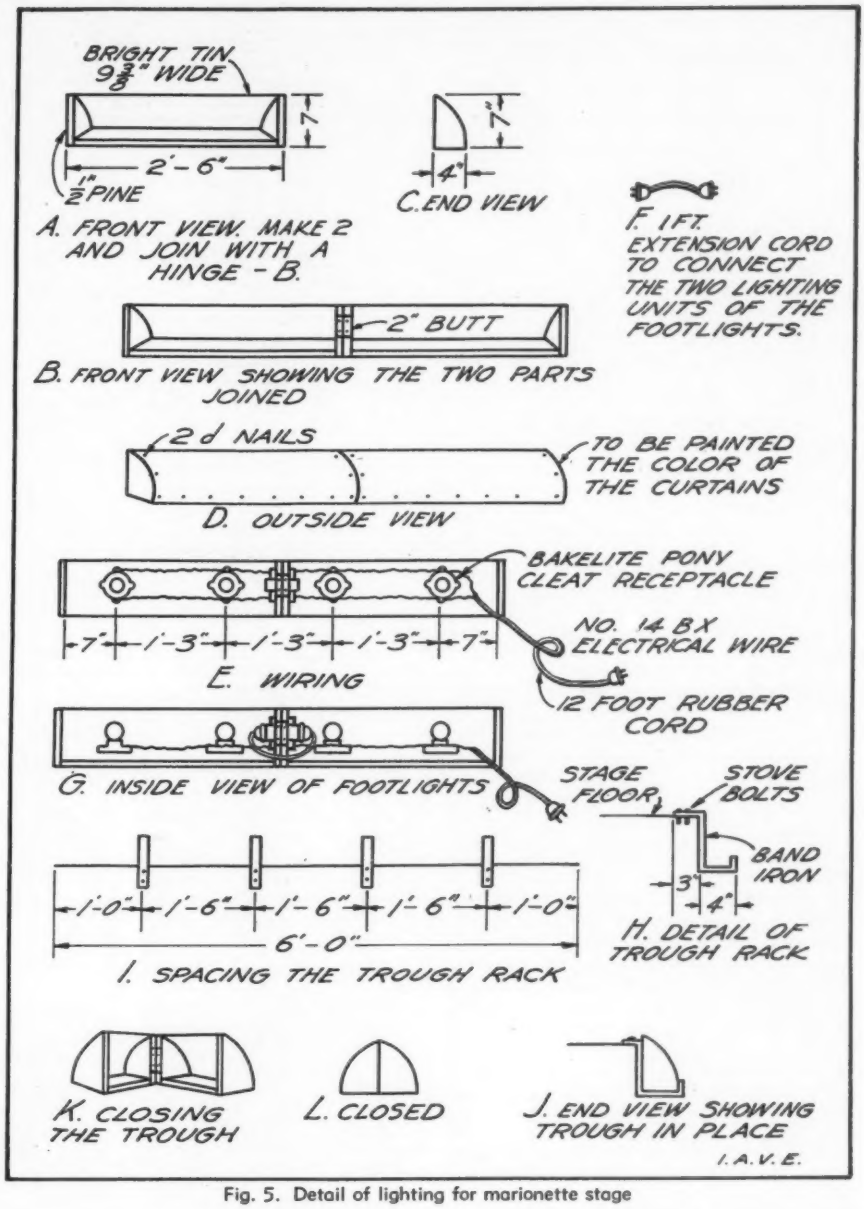


Fig. 5. Detail of lighting for marionette stage

drapes, table lamps, and Christmas-tree lights. To make this stage, choose your doorway and arrange your equipment as shown in Figure 4.

However, the semiprofessional stage will need better lighting equipment. This stage requires footlights and overhead lights. Figure 5 shows the details of the footlights. A study lamp that has a clamp on it may be clamped on each one of the upright dowels. These lamps will take the place of the overhead trough of lights. There should be a switch for each section, foot, and headlights. This should be so planned that the whole system may be worked from an ordinary wall plug.

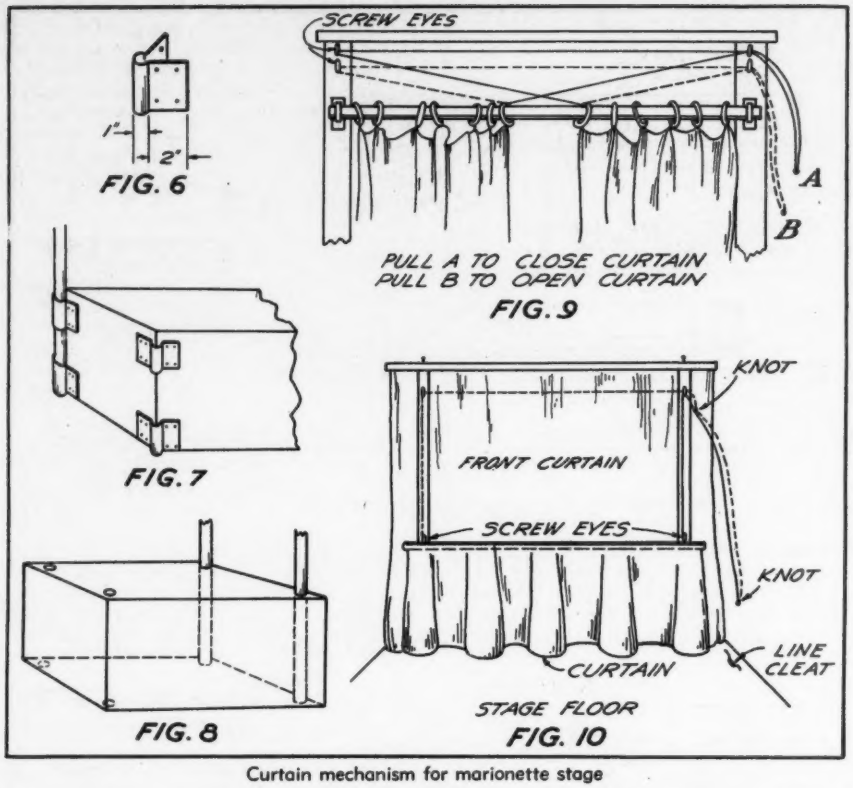
A more complicated stage is made of wooden boxes, dowel rods or cane, and drapes. During the day these boxes can house the stage equipment and marionettes. At night, they become the stage floor and bridge.

To hold the two front uprights for the front curtain and the two for the backdrop in place, put two metal ferrules, Figure 6, on each corner of the box, shown in Figure 7. These ferrules should be large enough to hold 1-in. dowels in place. Make them fit tight so that there will not be any play. If these metal ferrules cannot be secured, bore a 1-in. hole through the bottom and the lid of the box at each corner, and push the 1-in. dowel rod into the holes in each corner. See Figure 8.

Drive a 6d finishing or casing nail in one end of each of the upright dowel rods to hold the crossbars. These may consist of 1-in. dowels or cane, with a 3/16-in. hole bored 12 in. from each end. See Figure 1. The front curtains are hung on the front of the stage as shown in Figure 2.

The stage curtain may be a window shade, or it may be made of cloth. If the parting curtain is used, study Figure 9 before putting it up. Notice how it is strung so that the curtain may be closed or opened easily.

If you do not want the complicated curtain design shown in Figure 9, you may use the simpler one shown in Figure 10. The stringing



Curtain mechanism for marionette stage

is very easily done. Make and string the curtain according to the illustration. Be sure the curtain hangs perfectly straight before knotting the two ends of the cord together. This insures an equal pull on the strings. Lower the curtain. Practice pulling it up and down a few times. Then lower it again, and knot the two cords together up near the screw eye. Allow enough cord to reach to the side of the stage floor. Screw a line cleat to the floor on the right side of the stage, and fasten the cord to the cleat when the curtain is raised. These stage construction suggestions should help you to make any kind of stage that you may want.

DEMONSTRATION BOARD FOR DRAFTING STUDENTS

Clyde R. Garl,
McKinley High School,
Canton, Ohio

Jackshafts, eccentrics, cams, and followers, are puzzling terms applied to industrial machinery. But they hold no mysteries for McKinley High School boys studying machine designing.

These students now see most of the principles of power transmission exemplified in working models mounted on a hanging display board in their classroom.

The working models were constructed by the instructor as a leisure hobby. Plans for the display are drawn by seniors in their advanced machine designing class.

Except for the gears donated by the Boston Gear Co., most of the parts in this model demonstrator are cast and machined out of castway aluminum automobile parts.

Powered by 1/20 h.p. electric motor, the driving motion is carried from the main shaft to the models through bevel gears. These gears meet at right angles and carry the power to other line shafts which aid in driving miniature machines. A jackshaft reduces the motor's 1725 r.p.m. to 100 r.p.m.

By viewing the working models, students get a concise and clear demonstration of how a gear train is applied to a hoist, sacrificing speed for concentrated power.

The pinion and rack model show how rotary motion can be changed into reciprocating motion. The cam action demonstrates how automobile valves work.

The mysteries of jig-saw operation and the principle of the old-style steam engine are revealed by the model eccentric wheel.

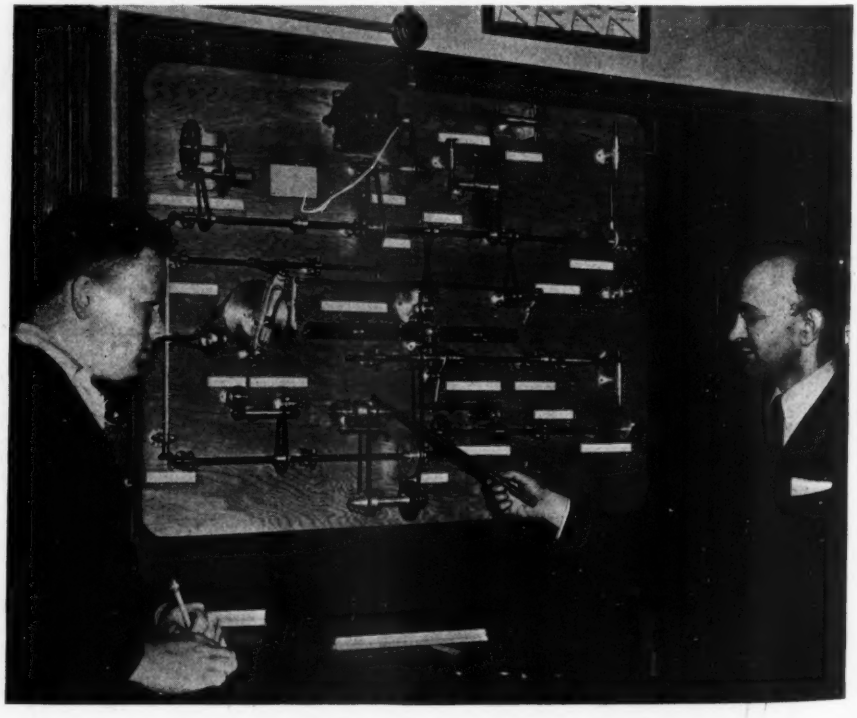
The spiral gears coupled with a threaded worm and worm wheel demonstrate how power is applied to machines. The arrangement of one unit develops a quick return motion and a powerful forward thrust as used on a shaper ram.

The plate cam and follower utilizes the rotary motion of the line shaft in developing perpendicular motion. The drum cam and follower develops motion parallel to the main drive shaft.

Then there are demonstrations of the intermediate gear which reverses the direction of motion, intermittent motion, and flexible coupling.

These models simplify the principles of machine units employed in industry, and fascinate the curiosity of both the mechanically minded and those who do not readily understand mechanical motion.

The following are a list of motion and power transmission units shown on the board: 1/20 h.p. motor, jackshaft, line shaft and hangers, pulleys and belts, idler pulley, bevel gears, spiral gears, worm gears, gear and pinion, pinion and rack, gear train-lifting hoist, Wentworth quick return, intermediate gear reverse, intermittent motion, back-geared lathe headstock, cone clutch and shifter, friction clutch, eccentric and strap, crank and link motion, flexible coupling, drum cam, plate cam and roller follower, cam and engine valve.



Demonstration board for the drafting room

THANKSGIVING CARDS

May Lillian Lampe,
Weehauken, N. J.

Designs for thanksgiving cards seem more limited than those used for almost any other festive day throughout the year. The gobbler,

while still popular, has been used overly much. Flowers are in good taste at any season, and sometimes a photograph of a blossom, taken against a black background, will help produce a composition that is more than acceptable; or a copy of a famous painting may be made, simplifying its detail, as was done with George H. Boughton's Thanksgiving, "Pilgrims Going to Church." This painting, which is in the New York Library, expresses so well the fundamental idea for which Thanksgiving Day was established. There are numerous other paintings with one or two figures like Priscilla and John Alden, also by Boughton. The cutting on the latter is much easier than the one shown in this article.

Harvesting scenes are fine subjects, too. These may be obtained by taking snapshots on trips through the countryside. Designs taken from pictures obtained in this way usually will be much more satisfying than those copied from work produced by other artists, no matter how good or how famous they may be.

Visualizing the finished design before it is begun always gives one a definite plan to work on. As far as handling the tools is concerned, only a fundamental knowledge is necessary. It is more or less a matter of persistent practice to become a skilled engraver. The usual two or three gouges of different widths and a knife are all that is required to do good work. Keep the tools extremely sharp. A good whetstone and a few slips should always be at hand. Linoleum and artcraft rubber are both used for cutting blocks.

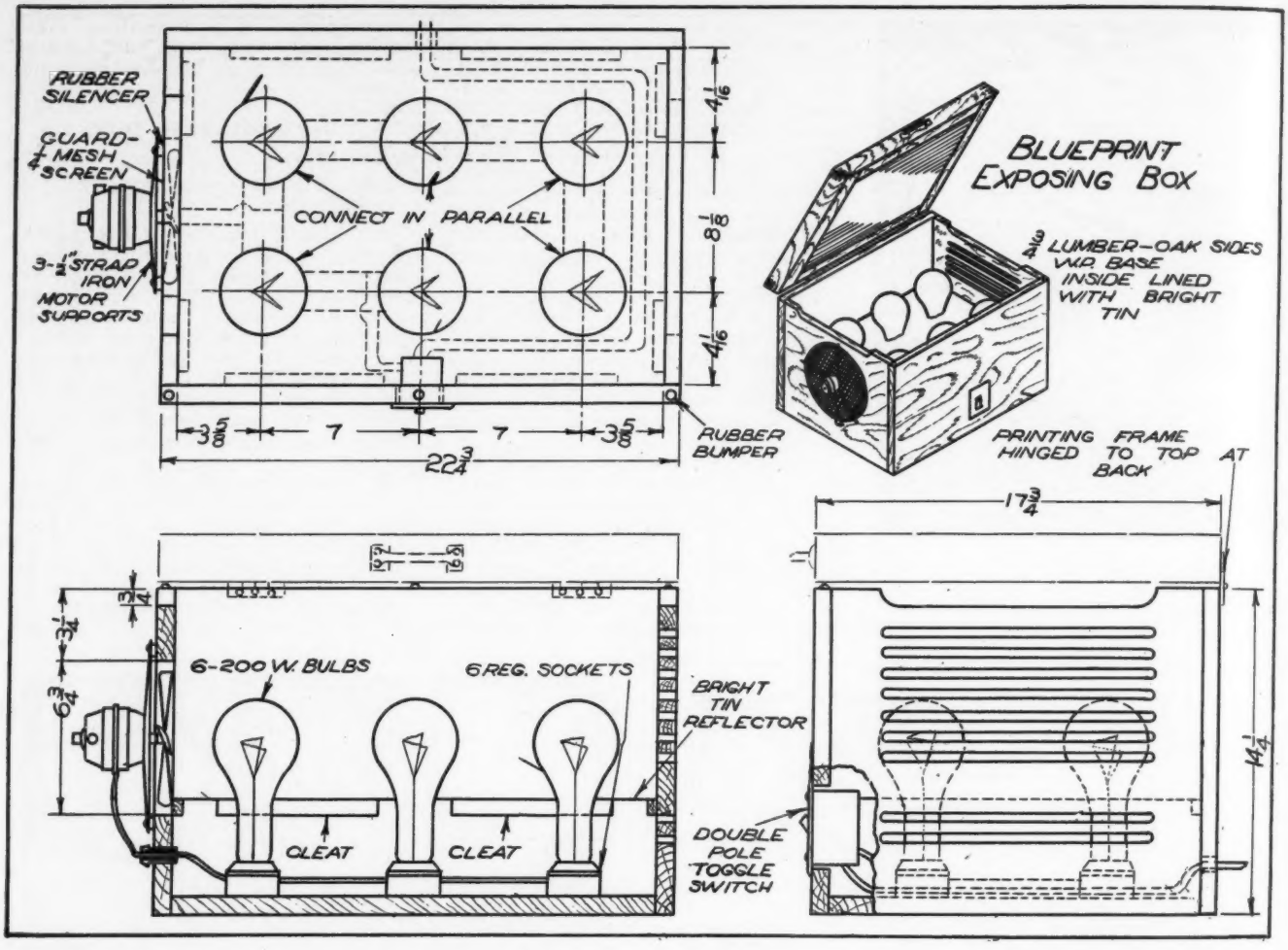
BLUEPRINTING BOX

Fred C. Bartels,
Public Schools,
Detroit, Mich.

The blueprint exposing box was made to fill the need for an inexpensive device to expose prints without the aid of an undependable sun. The investment of any amount in a commercial blueprinting machine seemed out of proportion to the usefulness in a school with only one drafting room. Small capital, plus an 18 by 24-in. printing frame (standard equipment), had to be combined with some small ingenuity to produce a workable indoor device to make blueprints.

All school departments cooperated to make it a success. Wood, sheet metal, and wood screws, were donated by the general shop; six 200-watt lamps and some No. 14 r.c. wire by the maintenance department; electric fan by a student; rubber corks used as fan silencers, by the chemistry department; the sockets, hinges, connection plug, porcelain

Thanksgiving-card designs for the block cutter



tube, and rubber buttons were purchased at a dime store; and the switch and extension wire at the local hardware store. The donation of the instructor's time to assemble the parts completed the scheme to result in a very satisfactory machine.

This machine is used on a wide window ledge. Where such a ledge is not available, the addition of short legs proves an added convenience.

The fan was a necessary addition to prevent overheating and possible cracking of the glass in the printing frame.

The double pole switch was deemed advisable, as lamps and fan were calculated to pull a combined load of approximately 12 amperes. Heavy extension wire was used for the same reason.

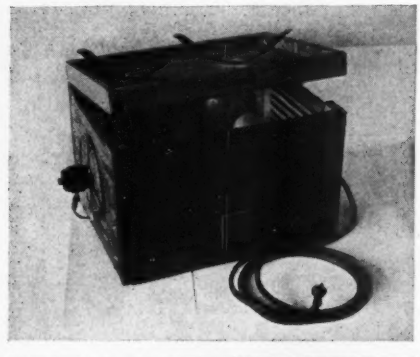
Using "medium rapid" blueprint paper, a print can be made in ten minutes. However, with "electric rapid" paper this time can be reduced to six minutes. While this is somewhat slower than direct summer sunlight, the time element is more than compensated by the convenience of the machine and the uniformity of results.

DON'T BLOT THAT DRAWING

Donald Maley,

State Teachers College, California, Pa.

Many hours of hard work and study on a drawing may be marred by a nasty blot of ink. This blot is often caused by the ink in the pen coming in contact with the straightedge, and then running down onto the paper. One way to remedy this situation is by putting two small squares of paper under the ends of the straightedge, to keep it from touching the paper. In this way the ink is prevented from running onto the paper. The squares may be made of bristol index about 2 by 2 in., pasted together to form a thickness of 1/16 in.



Blueprinting box

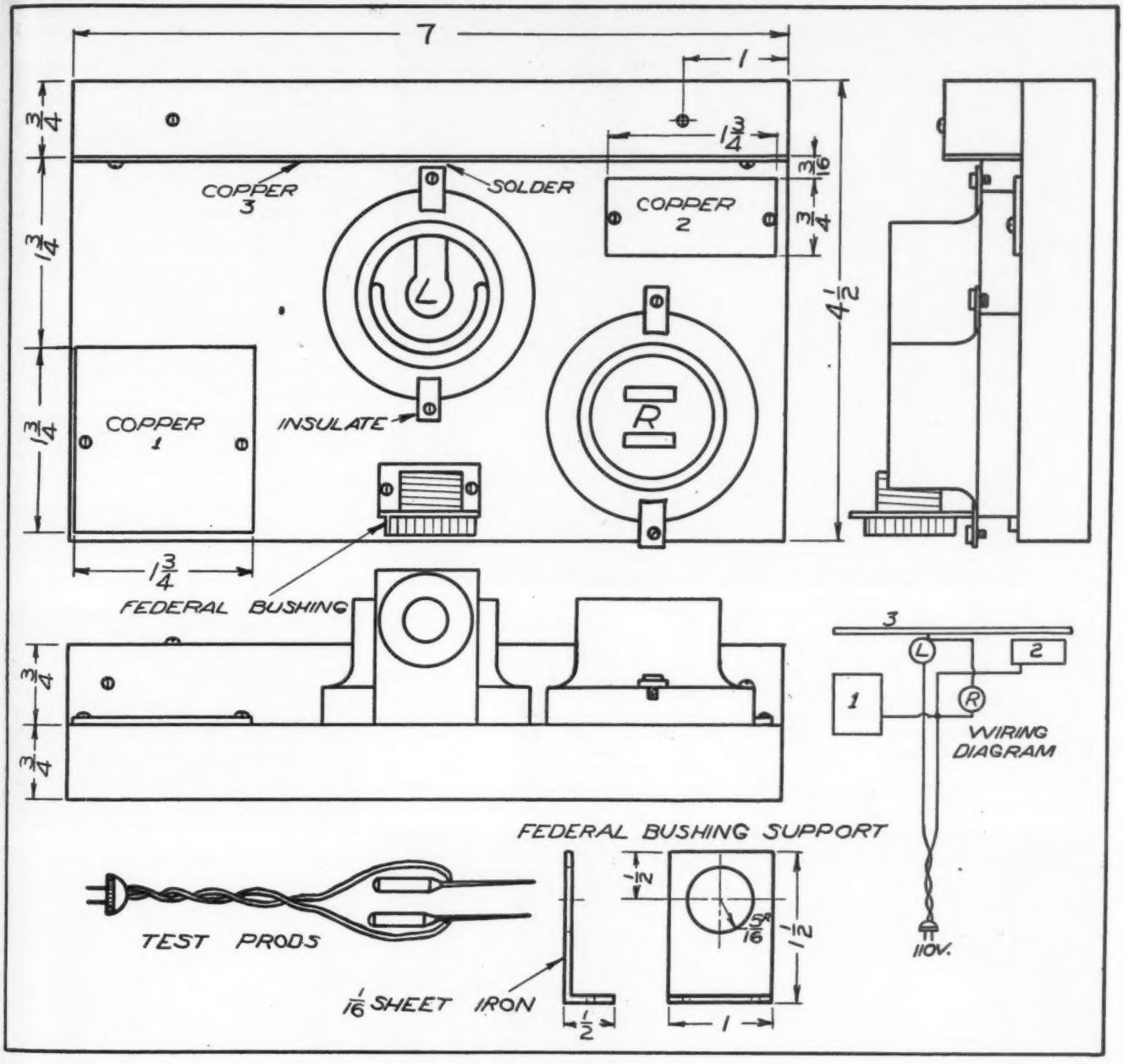
FUSE AND CONTINUITY TESTER

J. D. Hopkins,

Trade and Industrial School, Abingdon, Va.

The tester described herewith is inexpensive, portable, and easily constructed from materials found in any electric shop. Two pieces of wood, one ¾ by 4½ by 7 in., and the other ¾ by ¾ by 7 in. will be required. These two pieces are fastened together with roundhead wood screws as shown, to form the base of the tester.

From any suitable gauge sheet copper, aluminum, or brass, cut three pieces, one 1¾ by 1¾; another ¾ by 1¾; and a third ¾ by 7 in. Drill holes and fasten these pieces to the base with small wood screws. Be sure that pieces 1 and 2 are placed as shown in the illustration, so that when plug fuses are placed on 2, the side of the fuse will touch 3. Likewise, when one end of a small cartridge fuse is placed on 1, the other end should touch 3. Pieces 1 and 3 also serve to test



Details of fuse and continuity tester

cartridge fuses up to and including the 100-ampere size.

Two porcelain lamp sockets and a plug to screw into one of them will be needed. The one is to be used for the test prods. Mount the two sockets on the base as shown, using wood screws. No dimensions are given for placement of the sockets as this will depend largely on the size and type of socket used. One side of the lamp socket may be soldered to copper strip 3 if it is so placed.

Make the federal bushing support and mount it on the base with the federal bushing. Then pass a 6-ft. piece of lamp cord through the federal bushing, allowing enough for connecting. Tie an underwriters' knot in the cord to prevent it from pulling out. Connect the plug cap to the other end of the cord, also using an underwriter's knot. Make the other connections as shown in the wiring diagram. Make connections to the copper pieces by soldering the wires to them.

While fuses of both the plug and cartridge type are quickly and easily tested by placing them across the copper strips on the base, the tester can also be used to test other circuits and appliances for continuity. This is possible if a set of test prods are made up of a piece of lamp cord, two wood-handle ice picks, and a plug cap. Assemble these as shown, and plug into the receptacle *R* that has been wired into the circuit.

To prevent any possibility of a short circuit from the test prods after all connections have been made, insulate the socket connection so marked on the drawing by wrapping it with friction tape.

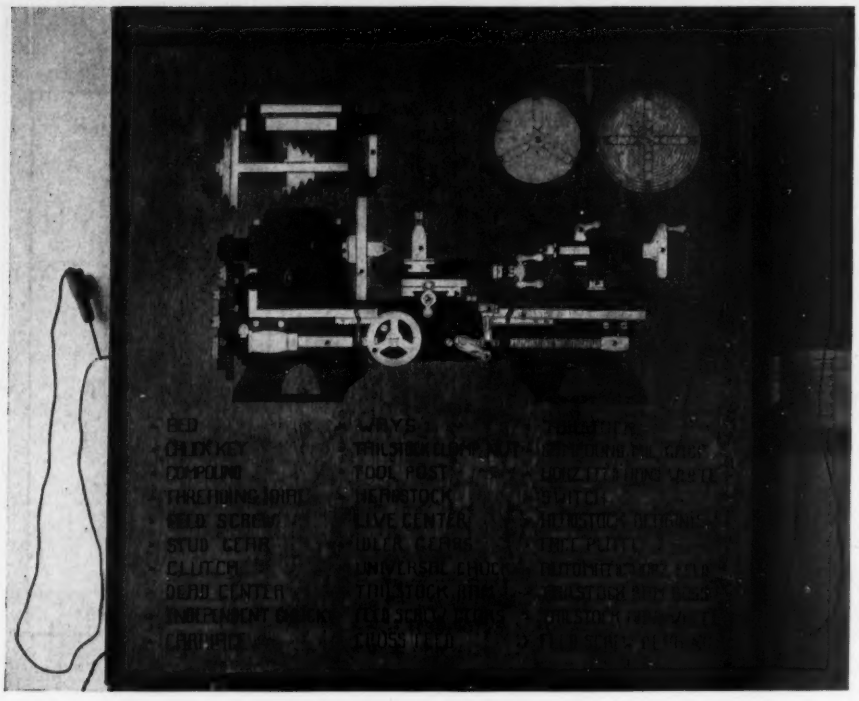
A 25- or 30-watt lamp will serve nicely for a test lamp when placed in the lamp socket marked *L*.

LATHE PANEL

John M. Ayres,
Shop Instructor,
W. K. Kellogg Consolidated High School,
Augusta, Mich.

The lathe panel illustrated and described herewith is one that was constructed and used in the general shop of the W. K. Kellogg Consolidated High School, Augusta, Mich., of which Mr. O. E. Harrington is superintendent. This project was stimulated by a new type of student planning and evaluating sheet that had been introduced at the Kellogg High School.

Before each major project is begun, definite objectives are set up, and at the completion of each project, evaluations and suggestions for future study are made by the student



Front view of lathe panel

Courtesy Atlas Press Co.

or group of students working on the particular project.

The lathe panel was designed, planned, constructed, and evaluated by three advanced shop students, who had previously completed a project entitled "An Electrical Woodworking Test Chart," which was designed by Joseph B. Kelley and which appeared in the December, 1940, issue of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine.

Their suggestion for further study along these same lines was a panel that would teach the parts of the metal lathe. Each step in the progress of this project, such as the designing, planning, working out the bill of material, constructing, and evaluating, was permitted after a conference with the instructor.

In evaluating this project it was found:

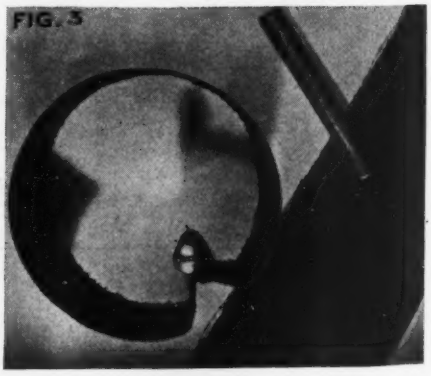
1. That it was a definite visual and practical teaching aid.
2. That it stimulated interest in the shop program. The boys would congregate around the panel in groups of 10 or 12 and test each other on the parts of the metal lathe without being assigned to it by the instructor.
3. It was a definite aid to the instructor in giving demonstrations on the metal lathe due to the fact that most of the boys had a knowledge of the location of the parts of the lathe.
4. That the cost of the panel was surprisingly low for the amount of value gained, the total cost being approximately $2.50.

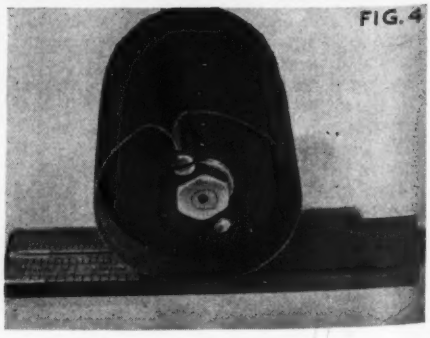
AN ABRASIVE WHEEL

Homer C. Rose,

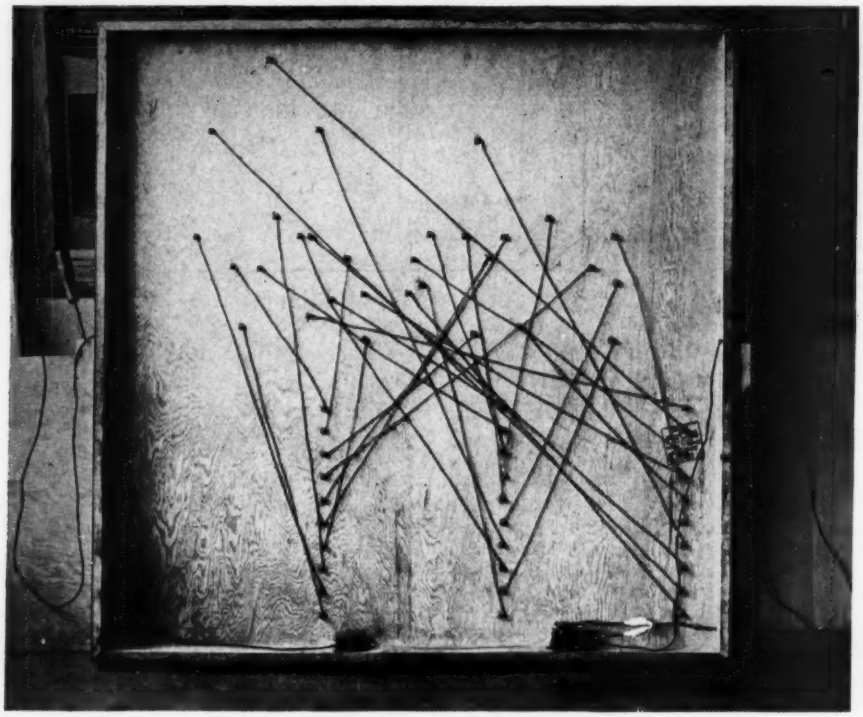
Southern Illinois State Normal School, Carbondale, Ill.

The abrasive wheel illustrated herewith has been used for five years in school shops and has given excellent service. The wheel is designed to be used for polishing metals of all kinds, both hard and soft, and can be used for fast cutting on very hard metals as shown by the fact that a ¾-in. power hack-saw blade which has been ground the full length may be cut back to a fine polish in about two minutes with this tool.





The abrasive wheel



Rear view of lathe panel

Courtesy Atlas Press Co.

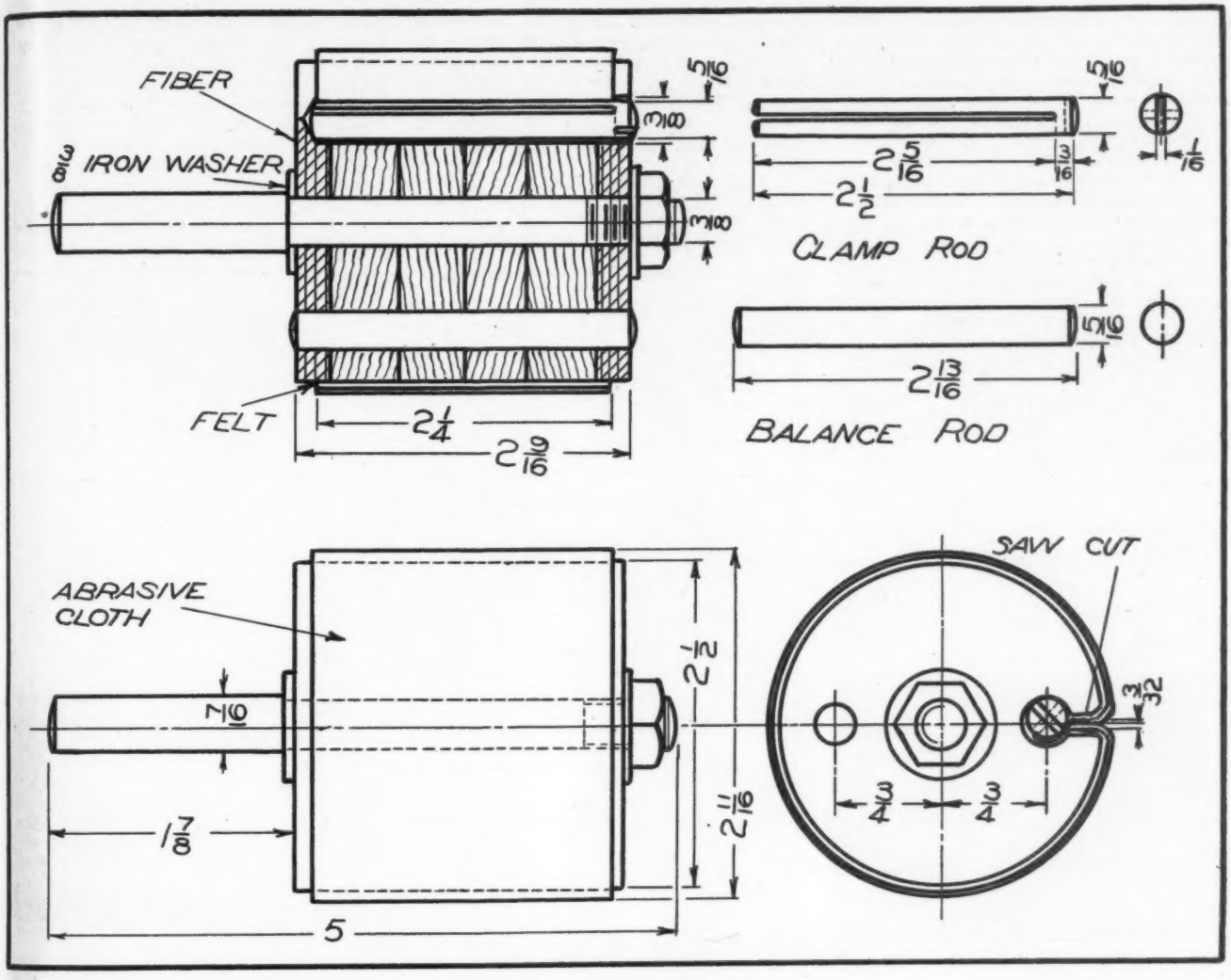


Fig. 1. Details of the abrasive wheel

The following description of other abrasive wheels is given for the purpose of comparison.

1. The *charged wheel* which is made of cloth covered with glue onto which is placed the abrasive powder. There are these disadvantages:

a) The wheel must be allowed to dry for some time before it can be used.

b) It changes cutting speed as the cloth wears down in diameter.

c) Special glue, etc., must be purchased.

d) Wheels of this kind are hard to keep in balance.

2. The *sleeve type* which is the most common is of rubber construction onto which a specially prepared and molded abrasive sleeve is placed. The drum is then expanded by tightening the nut at the end of the arbor which shortens the length of the drum but increases its diameter. These disadvantages are present:

a) Special sleeves at about 10 times the cost of sheet abrasives must be kept on hand.

b) Certain good abrasive materials are not available in this form.

c) Wheel may expand more in the center than on the edges.

3. *Patented ratchet type* is a wheel which which has a slotted tightener rod built in. One end of the rod carries a ratchet to hold it after the abrasive is pulled tight. The ends of the cloth are first stapled together with a special metal clamp which fits the clamp rod. The disadvantages are:

a) Special abrasive materials, furnished and fitted by the factory, must be stocked.

b) This wheel sells for $30 in its small size in comparison with about $1.50 for all others.

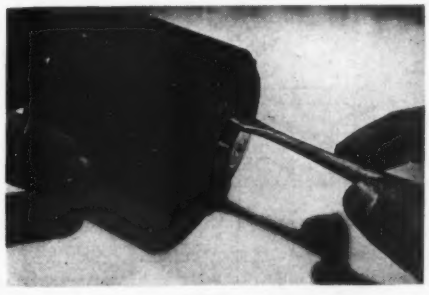


Fig. 5. Fastening the abrasive cloth in place

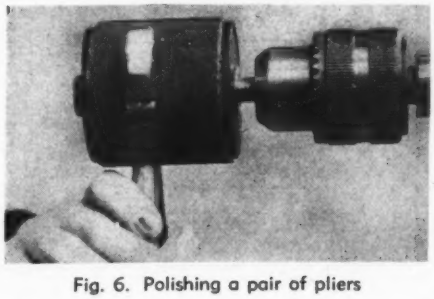


Fig. 6. Polishing a pair of pliers

The abrasive and buffing wheel, illustrated herewith, eliminates all gluing, drying, rebalancing, and the purchase of specially prepared abrasive materials. It is, therefore, a saver of time and money.

The correct speed is maintained because the wheel does not wear down sufficiently to change the diameter.

It will carry a wide range of abrasive cloth, such as the small shop, school, or home can purchase and is likely to have on hand for general purposes.

It is a safe wheel because it will not loosen, break, or blow up.

It can be used on flexible shafts or stationary spindles of all types and at speeds easily obtained on the standard drill press.

It does not *bump* when running at the proper speed (about 2000 r.p.m. for general use).

The wheel may be made of any suitable material ranging from cast aluminum to the

plastics. It is mounted on a steel arbor which can be held in the chuck of a drill press, on the lathe, or on the flexible shaft. The most popular construction has been the laminated wheel of hardwood terminated at each end with a ¼-in. disk of fiber as shown in Figures 1 and 2.

Two holes are drilled, one on each side of the arbor and equidistant from the center. One hole is used to hold a 5/16-in. steel rod which is driven into place. This rod serves as a balance for the one on the other side which holds the ends of the abrasive cloth and acts as a tightener. The hole into which this clamp rod fits is ⅜ in. in diameter, making it 1/16 in. larger than the 5/16-in. rod. The clamp hole extends through the wheel to within a short distance from the opposite side. The clamp rod is cut on the center line to within ⅛ in. of the opposite end, which has a screw-driver slot at right angles to the saw kerf.

The surface of the wheel is covered with a soft material such as felt, or mohair. The ends of this material are matched at the slot which runs down on the center line through the clamp rod and the clamp-rod hole.

To set up the wheel, a 2¼-in. strip of abrasive cloth is torn from a standard 9 by 11-in. sheet. This is cut to a determined length which varies slightly for the different grades of abrasive.

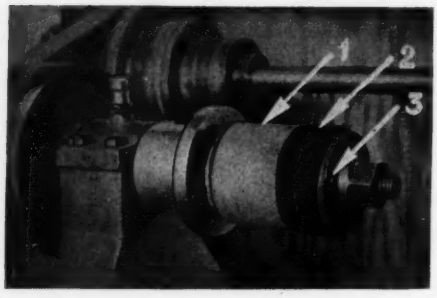


Fig. 7. Abrasive wheel mounted in a lathe
1—abrasive cloth (cut away)
2—felt or frieze
3—balance rod

The ends of the cloth are brought together with the abrasive turned in and the clamp rod is slid into them, as shown in Figure 3. The resulting cylinder and the rod are then placed on the wheel with the screw-driver slot exposed, as shown in Figure 4. A turn of the clamp pulls the cloth tight and at the same time, because of the extra material that is drawn into the clamp hole, secures itself so that it cannot pull out. See Figure 5. It may be noted from the end view in Figure 1, that the cloth has been bent around three angles and is also pressed against the side walls of the hole. During five years of general use in school shops we have not had a sheet of abrasive cloth work loose from the wheel.

The appearance of school projects having ground or filed metal surfaces will be greatly improved through the use of this abrasive wheel.

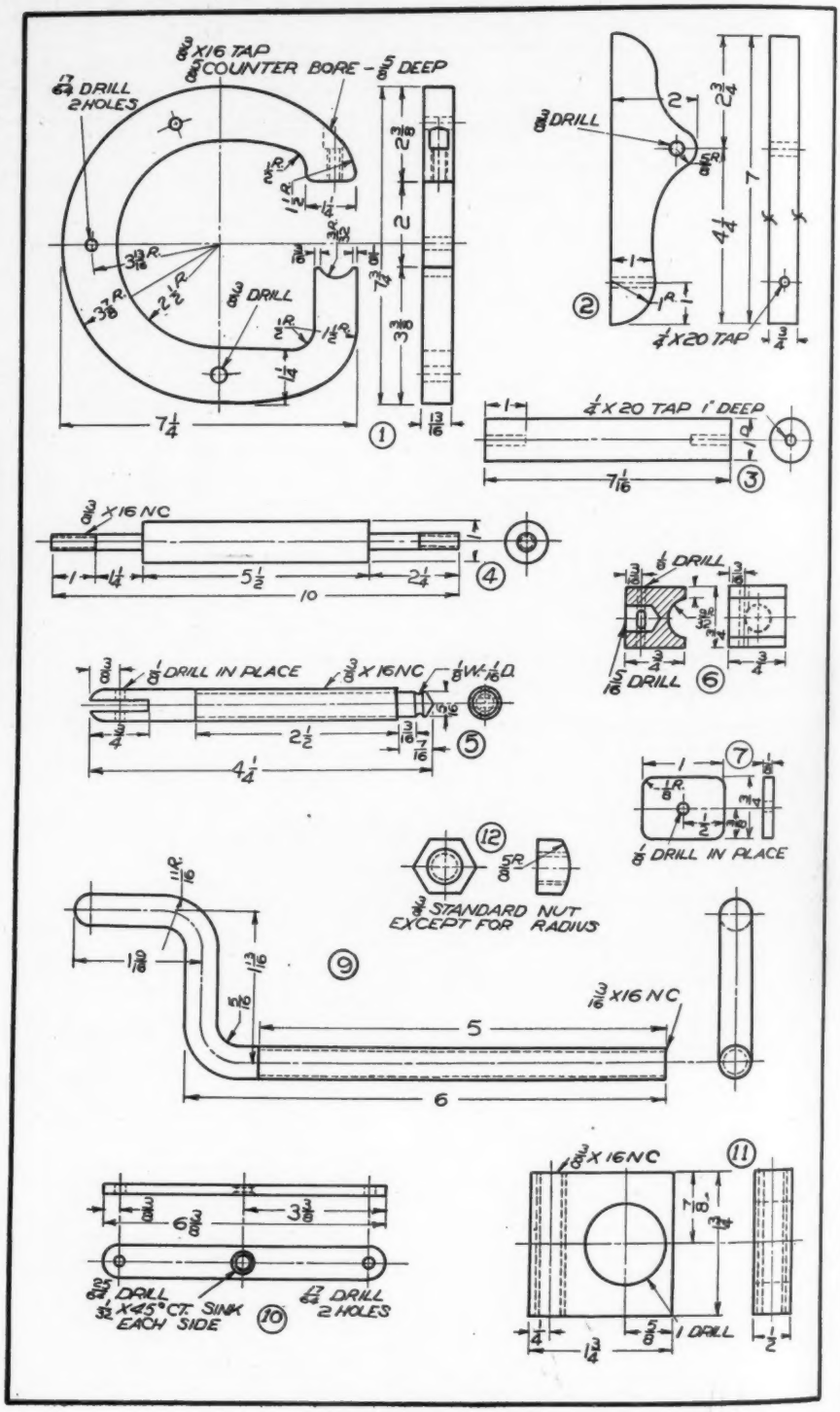
SKATE SHARPENING JIG

H. W. Babcock,
Detroit, Mich.

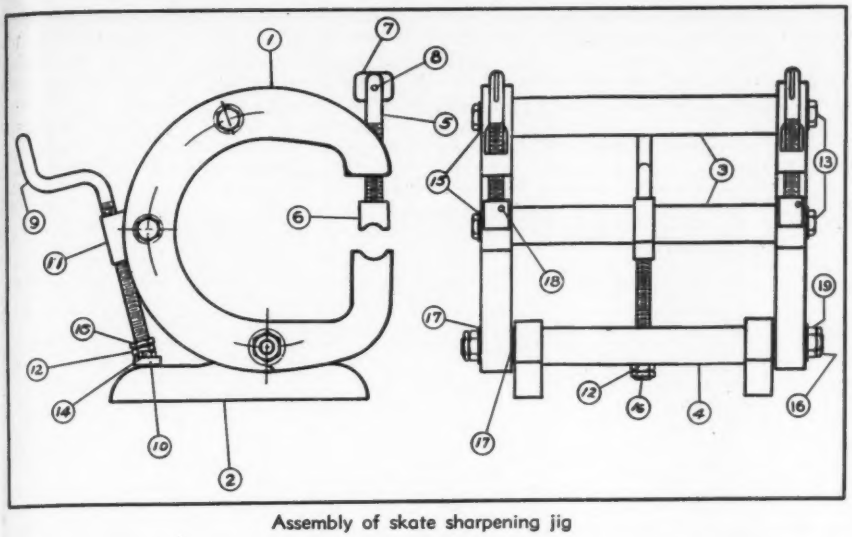
So many of the boys had asked whether they could sharpen their skates in our shop that I finally decided to do something about it. Our shop equipment includes a substantial floor grinder so that all we needed was a holder of some sort. The jig that was finally worked out can be used with any grinder by providing a solid table to slide it on. Skates sharpened this way are known as "hollow ground." The runner or blade is concave on the bottom presenting two sharp edges to the ice and staying sharper longer than when ground flat.

A wooden jig was first made. The shape of the ends and the adjusting arrangement was altered several times until final perfection. This wooden jig was used for some time but wasn't rugged enough to be boy proof, so the metal jig was made. The patterns for the feet and ends were made and the castings poured of aluminum. Aluminum was used for lightness and because it could be easily melted in our furnace. All the other parts are from the regular school shop supplies.

The adjusting arrangement permits the jig to be used on grinders having the tables at different levels. It also allows for any variations in shape and size of the skate runners. It permits the skates to be set exactly on



Details of skate sharpening jigs



Assembly of skate sharpening jig

center. To assemble this part, the adjusting block, Detail 11, with the threaded hole toward the rear, is slipped over the back upper spacer, Detail 3, before the two ends are assembled. The crank, Detail 9, is turned through the block and fastened to the center hole in the bracket, Detail 10, with the two special nuts and two lock nuts, one of each above and below, with the rounded side of the special nuts forming a bearing in the chamfered hole. The nuts holding the ends to the bottom spacer, Detail 4, are set to give firm tension but not too tight. There is a plain, ⅜-in. washer between the feet and ends to permit easy adjustment.

In using the jig, always clamp the skate firmly and then touch lightly to the grinding wheel to determine if the adjustment is correct. One cut is usually sufficient. Take care to keep the skate blade flat on the face of the grinding wheel. Grinding on the corners of the wheel will produce a rough job. The burr or hair edge that the grinder leaves can be easily removed with a small hand stone.

This jig enables even the boys with the least skill to put a fine edge on their skates. They not only sharpen their own, but want to sharpen the skates of everyone in the neighborhood as well. The jig is a practical demonstration to the student of the value of learning how to do things properly.

The skate sharpening jig in use

Bill of Materials

Part No.	No. Required	Name	Material	Size
1	2	Ends	A1.	
2	2	Feet	A1.	
3	2	Top spacers	C.R.S.	
4	1	Bottom spacer	C.R.S.	
5	2	Clamp screws	C.R.S.	
6	2	Clamp block	C.R.S.	
7	2	Clamp handle	C.R.S.	
8	2	Clamp pins	C.R.S.	⅛ by 23/32
9	1	Adjusting crank	C.R.S.	
10	1	Bracket	C.R.S.	
11	1	Adjusting block	C.R.S.	
12	2	Special ⅜ nuts	C.R.S.	
13	4	Cap screws	C.R.S.	¼ by 1¼
14	2	Cap screws	C.R.S.	¼ by 1
15	4	Washers	C.R.S.	¼
16	4	⅜ Lock nuts	C.R.S.	2⅜ nuts 19
17	4	⅜ Washers	C.R.S.	
18	2	⅛ Rivets	C.R.S.	

MODEL BASKETBALL COURT AIDS COACHES

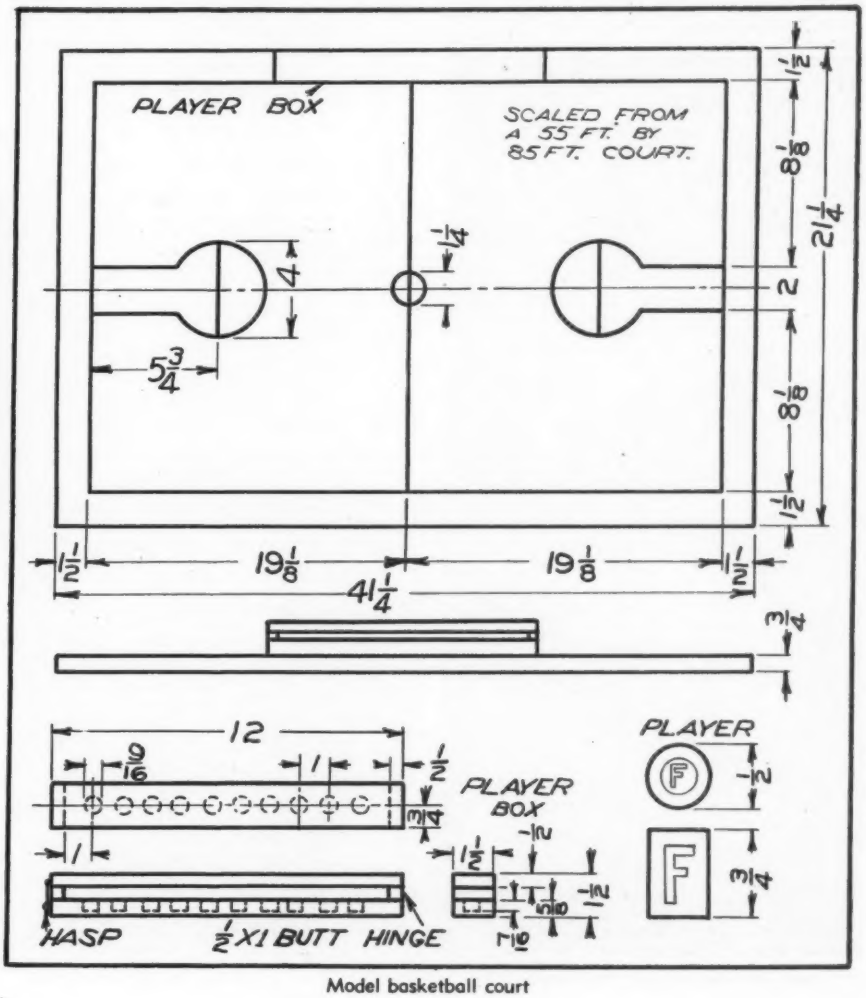
Fred McGinnis,
Mechanical Drawing Instructor,
Bernard Keefe,
Basketball Coach,
High School,
Santa Paula, Calif.

The basketball coach can carry out many phases of his work more effectively with the aid of a model plywood court equipped with ten miniature dowel-piece players who can be moved about.

The blackboard diagrams drawn to illustrate a particular play, drill, or formation, usually require a maze of crisscross lines which are confusing to the average player.

If the actual movements of players can be observed with the various positions and maneuvers of each one clearly visible, a certain play can be understood much more readily.

Effective use can be made of the board in introducing new plays, in illustrating proper formation for drills, and in showing fundamental positions on defense and offense. The model court is an invaluable aid for the between-halves period in illustrating strategies



Model basketball court

to be carried out during the second half of a ball game. It is during these precious 10 minutes that any timesaver will be greatly appreciated.

The board can be constructed to a scale applicable to any standard-size court. Finish with a good grade of floor varnish.

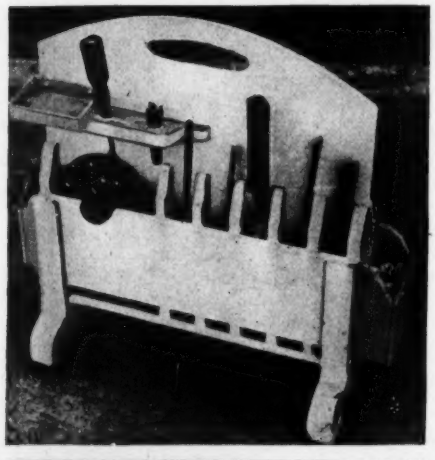
To increase the stability of the dowel pieces, cement vacuum cups to the bases. The board can then be inclined without the *men* tipping over. Placing the board on an incline will help the visibility if the model is used instead of the chalk in a *chalk talk*. However, the greatest use will be derived by having the players gather around the board placed on a table at the side of the court. The dowel pieces representing the visiting team, should be painted a flashy color which contrasts with the board and with the home team. To make explanation of plays still clearer, the "little men" should have ⅜-in. letters (F, G, and C), painted on the top and side.

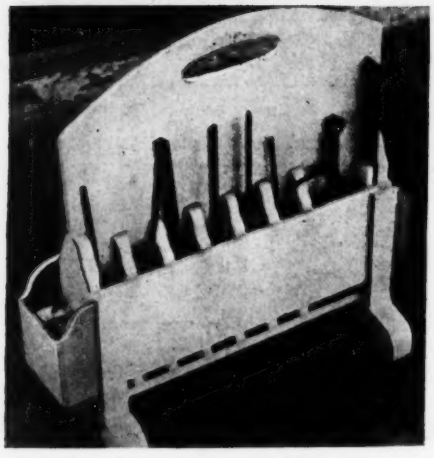
WOOD LATHE TURNING-TOOL KIT ON WHEELS

W. H. Ammon,
Los Angeles, Calif.

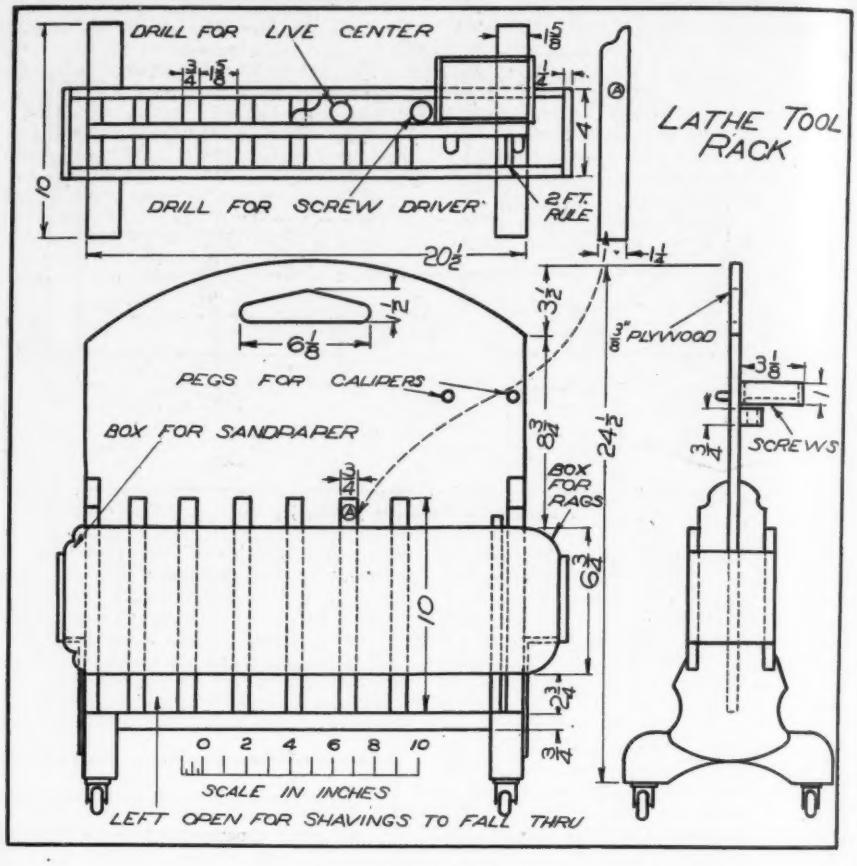
The kit described herewith saves carrying heavy tools to and from the lathe. It also saves the toolkeeper's time in checking in tools as every tool is in its place.

It speeds up work as the kit holds a full set of lathe tools, also live center, screw driver, rule, faceplate, calipers, rags, sandpaper, and screws.





Front and reverse side of turning-tool kit



Details of lathe-tool rack

PLAQUES AND TROPHIES

H. W. Schulze,
High School,
La Porte, Ind.

The making of plaques and trophies in the industrial-arts department provides a way for the department to assist the school when it awards trophies in the various contests, such as track, football, music, and the like.

The job of making a plaque or trophy brings about correlation of the drafting, patternmaking, and the metalworking shop

Fig. 1

Fig. 3

of the industrial-arts department.

In working out a design for a plaque, the drafting department prepares a full-size drawing. The design should be kept simple in feeling and should contain the important details of the event, such as the name of the

contest, the date, and the place of occurrence of the contest. The art department of the school might give valuable suggestions in the design. Ornamental plaster or composition ornaments, obtained from concerns specializing in them, may be used to embellish the design. The various foundry supply houses also supply white metal or brass pattern letters known as Gothic and their style makes them very easy to draw from the sand. The classic letter, used in Figures 1, 5, and 6, perhaps presents the best appearance. This type of letter draws well, but not quite as easily as the Gothic type.

After the design has been completed, and after the pattern letters and the ornaments is then placed in position and firmly pressed down. It is best to remove the shellac that has squeezed out after all of the letters have set up hard. This may be done with a well-sharpened pocketknife. After the pattern has been well cleaned and sanded, it should be given a coat of thin shellac over its entire surface, both front and back.

Fig. 2

Fig. 4

which may be used for the inscription. After a rough design has been prepared, the drawing should not be completed until the ornamentation and the letters have been obtained and then have been placed upon the drawing to obtain the actual spacing and relationship of the letters and ornaments. Hand lettering on the drawing will vary considerably from the actual metal pattern letters.

Ornaments such as those shown in Figure 2, may be carved from soft pine and affixed to the pattern. The music lyre used on the plaque shown in Figure 3 was first modeled in clay and then a mold was made of it in plaster of Paris. A cast was then made in lead. This cast may also be made by using dental plaster. This kind of plaster dries harder and takes more handling than plaster of Paris. The cast was mounted on the pattern with thick shellac.

Metal pattern letters come in various sizes and design. The letters used in Figure 2 are have been properly spaced upon the drawing, the pattern is made. A piece of ¼ in. thick birch plywood is of sufficient thickness for the back or main body of the pattern. The size of the pattern will depend upon the size of foundry flasks available and upon the amount of metal which can be poured at one time. The ornaments and the edging should then be fixed with small brads and glue. Wax fillets should be provided for all sharp corners. It is now very important that the pattern letters be arranged and spaced on the pattern. This is best done by placing them in position before fastening them with shellac. The pattern should be shellacked and let dry before arranging the letters. Guide lines and location marks for the letters may be made in pencil on the pattern background after the letters have been finally spaced. Each letter is then picked up by hand or with tweezers. A bit of thick shellac is then placed on the back of the letter and the letter

The plaques look best when cast in bronze. After the casting is thoroughly cleaned, it should be wire brushed and buffed so as to high light the tops of the letters, ornaments, and edgings. A spray coat of lacquer will prevent fast oxidation and tarnishing. The casting might also be made of aluminum and may then be copperplated. In casting items of this type a fine sand and parting dust should be used. It is also very good to dry the face of the mold by using a torch. The plaques shown in Figures 2, 3, and 4 were cast in the writer's school foundry. The rest were done in a commercial foundry.

A suitable board should be used for mounting the castings. A ⅜ in. thick solid walnut board provides a good mounting. To avoid a clumsy appearance, the board should not be too thick. The design of the board should follow and harmonize with the contour and feeling of the casting. The casting is fastened to the board by means of several 8-32

Fig. 5

Fig. 6

machine screws which are sunk through the board and screwed into the casting. The holes in the casting should be drilled and tapped with care and should be located in the thickest part of the casting if possible. The heads of the screws are countersunk in the back of the board. In order to locate the holes in the board, screws having a point filed on the outside end should be screwed into the holes of the casting. The casting is then carefully laid upon the mounting board and pressed down firmly so that the pointed screws leave a small hole in the board. The holes in the board are then easily drilled according to the location holes. The pointed screws are removed and the proper length machine screws are inserted through the back of the board into the tapped holes of the casting, holding it firmly in place.

In order to prevent marks and scratches on both the casting and mounting board, it is best to drill and tap the holes in the casting before it is buffed and polished, and before the board is stained and finished. The plaques may be fastened to the wall by using screws through the mounting board, or they may be made to be free standing by affixing small metal supports to the back.

TURNED LAMPS

C. R. Wells,
Yankton, S. Dak.

In the accompanying illustrations, we have two table lamps, one that is very easily made, and another that requires gluing up.

A good cabinet wood should be used and finished to suit the individual's taste.

The standard should be built of two pieces with a groove 3/16 by 3/8 in. in the middle of each. When gluing together, a plug 3/8 by 3/8 by 2 in. should be inserted at each end to take the lathe centers and to keep the grooves in line with each other. The bases of each are similar and both should be built up from two pieces of material.

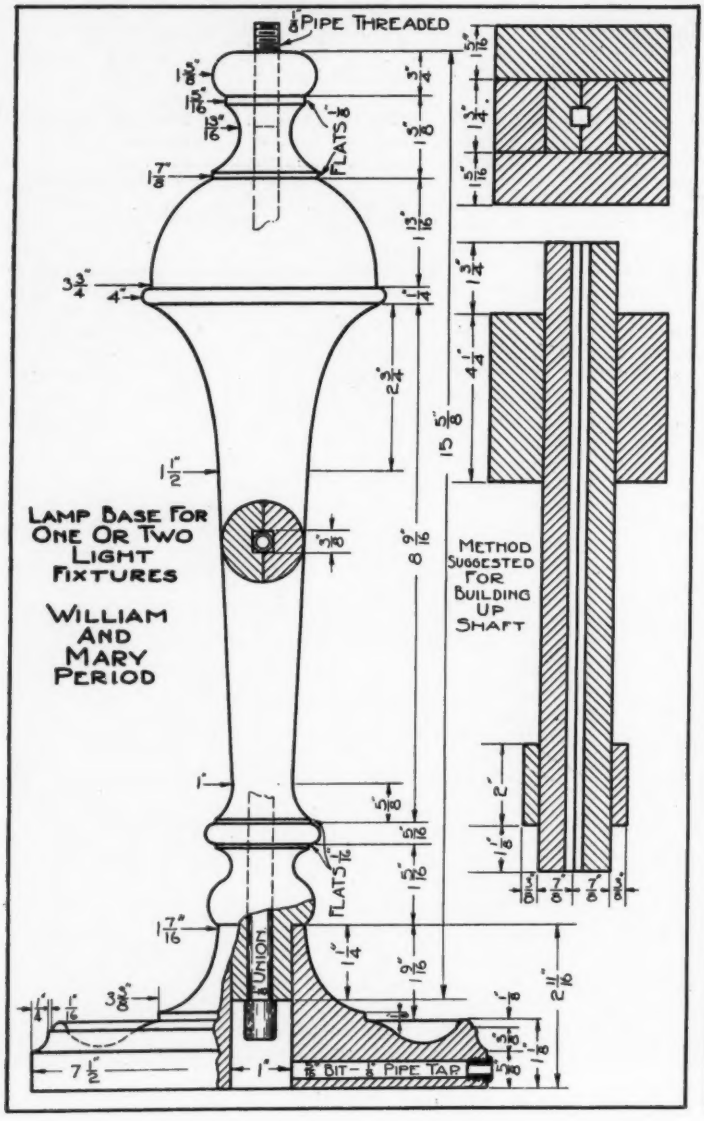
DECOY DUCKS

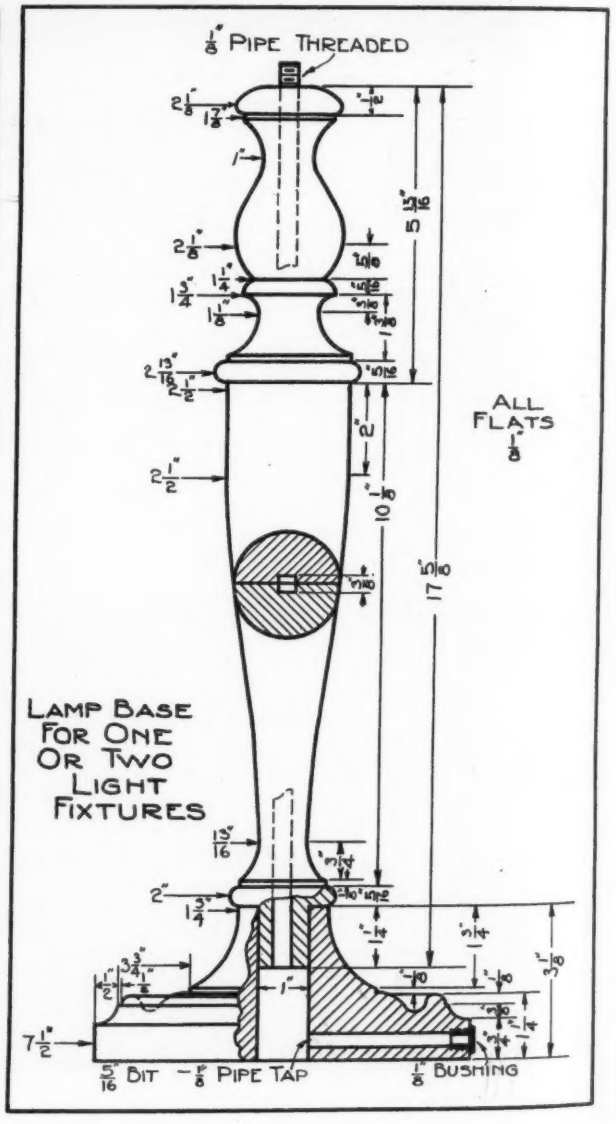
Ed. C. Hunt,
Hales Corners, Wis.

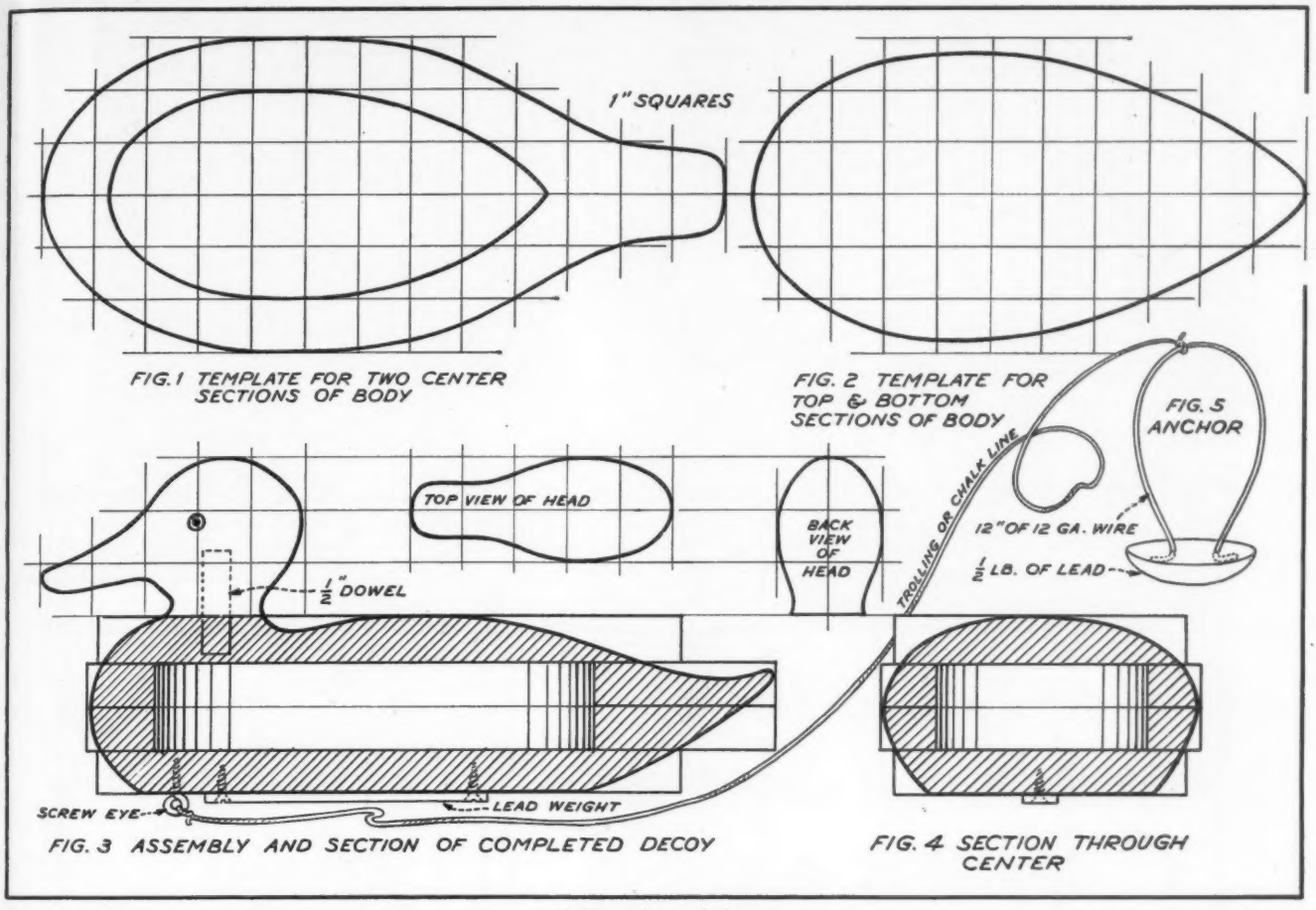
The hunter-craftsman should thoroughly enjoy making a set of decoys during the closed season.

Hollow decoys, being lighter, more buoyant and less likely to split are superior to the solid variety. Four feet of 7/8 by 6-in. lumber are required for the body of each decoy. Clear cedar or white pine are generally used but any softwood, free from sap or knots, will be found satisfactory. Make cardboard templates as shown in Figures 1 and 2. Each square represents 1 in. Mark two of each shape on lumber and cut out carefully with either a scroll or band saw. These 4 pieces are then glued together as shown in the lower portion of Figure 3, using casein or a good waterproof marine glue. Clamp tightly and allow to dry for at least 24 hours. The preliminary roughing out can be done with a drawknife following the general shape shown in Figures 3 and 4, being sure to leave a flat surface where the head joins the body. The final finishing should be done with a wood rasp or a sanding disk if one is available.

Heads are made of 2 by 4-in. lumber, approximately 5 in. being required for each. Figure 3 shows the shape and position of head usually found while ducks are resting on the water. The top and back views shown, will aid in the modeling. Either one ½-in. or two 3/16-in. dowels should be used when gluing heads to body. Turning a few heads slightly to right and left will make the set look more natural. There will be some finishing to do where head and body join, after which the decoys are ready for painting.






1" SQUARES
FIG. 1 TEMPLATE FOR TWO CENTER SECTIONS OF BODY
FIG. 2 TEMPLATE FOR TOP & BOTTOM SECTIONS OF BODY
FIG. 5 ANCHOR
TOP VIEW OF HEAD
BACK VIEW OF HEAD
TROLLING OR CHALK LINE
12" OF 12 GA. WIRE
½ LB. OF LEAD
½" DOWEL
SCREW EYE
LEAD WEIGHT
FIG. 3 ASSEMBLY AND SECTION OF COMPLETED DECOY
FIG. 4 SECTION THROUGH CENTER

Built-up decoy ducks

Get some pictures in color of the species of ducks you want and follow as close as possible using dull, flat paints. Glass eyes can be obtained from a taxidermist or from sporting goods stores. Good substitutes, and probably more durable, are brass-headed upholstering tacks which can be painted to imitate eyes. A weight on the bottom of each decoy is necessary for balance, and to prevent the decoy from tipping in a high wind. These can also be purchased at sporting goods stores but can easily be made of lead strips, each weighing approximately 6 oz. After fastening one end of the weight, float the decoy in a basin of water. Shift other end until decoy rides perfectly true. Then fasten the weight in place with ½-in. brass screws.

An excellent type of anchor is shown in Figure 5. The wire loop slips over the head of the decoy, after the anchor cord has been wound around body or neck. This prevents nasty tangles. Each anchor should weigh about ½ lb. A small screw eye in the decoy as shown, a suitable length of stout trolling or chalk line (depending on the depth of waters hunted) and all is set for this fall's duck season. Good luck.

PERSPECTIVE ARMS

Kenneth Grinager,
Central Intermediate School,
Honolulu, T. H.

The straight edges shown here might be called perspective arms as they are used like arms for making perspective drawings. There are two of them, one tacked at the right and one at the left vanishing point.

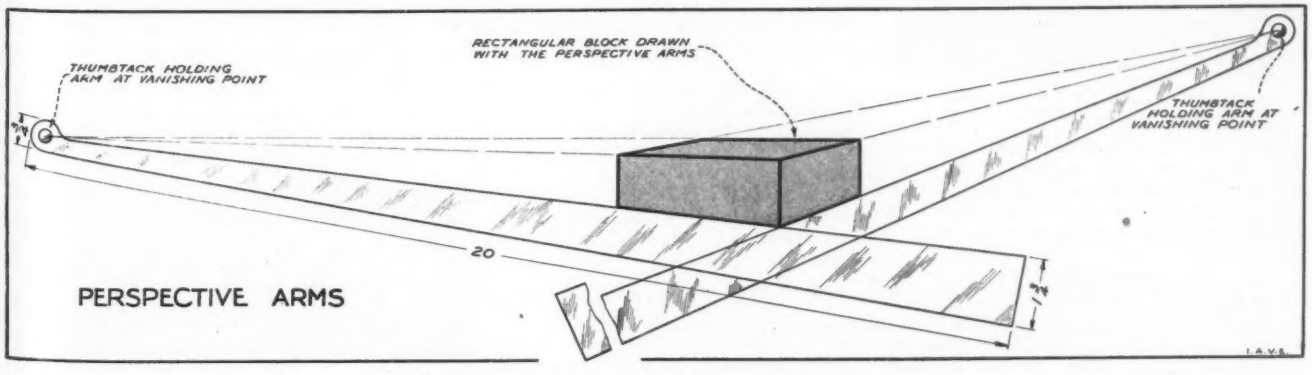
They can be cut any length from celluloid, sheet plastic or wood.

A thumbtack forms the pivot at each of the vanishing points. This permits one to move the straight edge easily to any selected point.

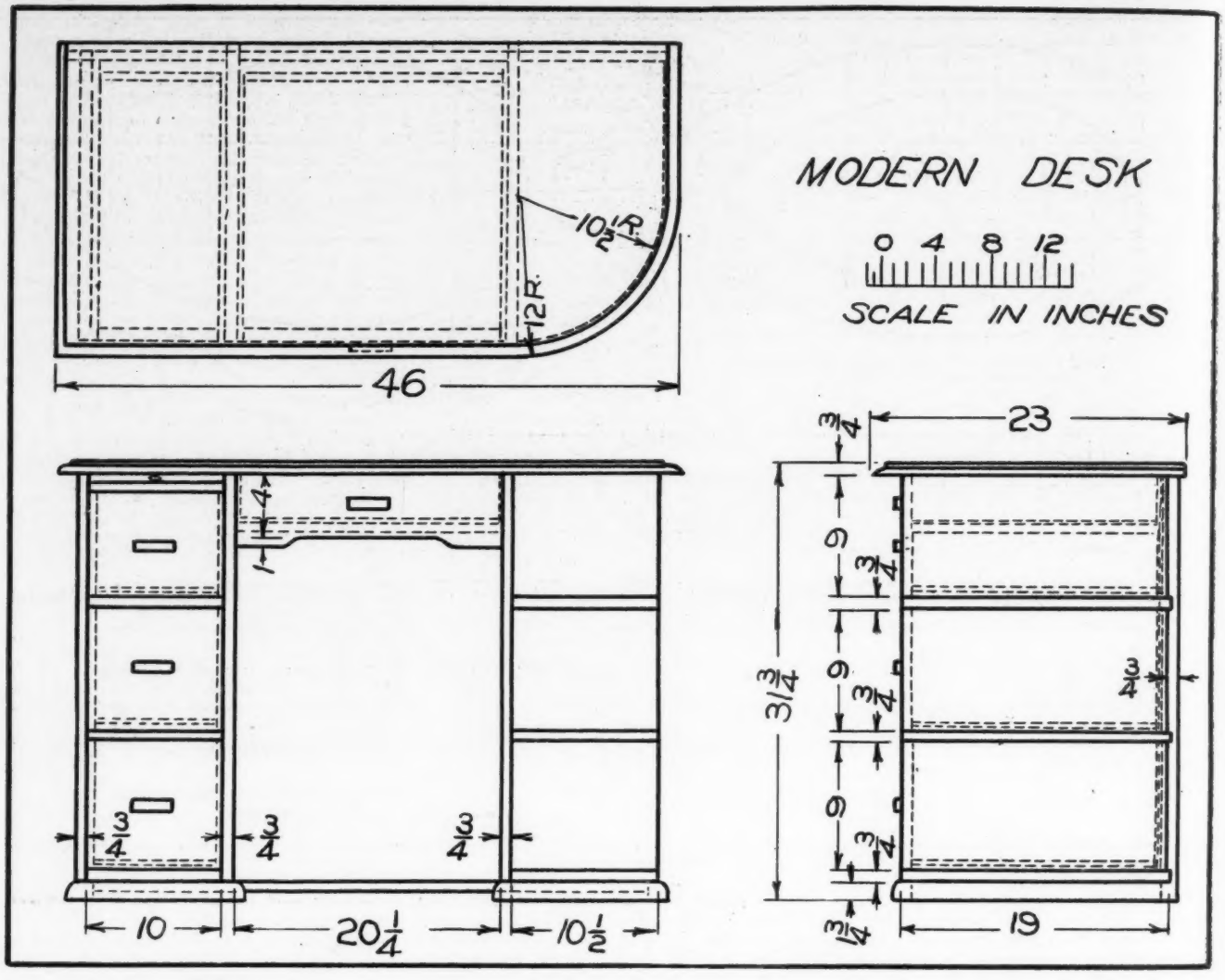
MODERN DESK

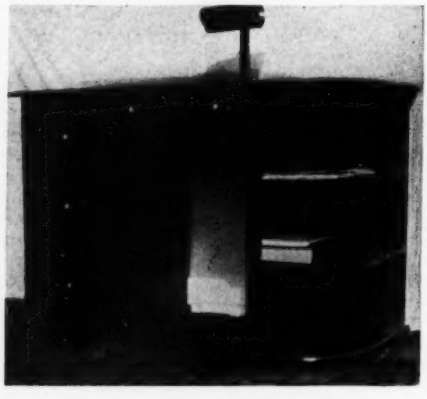
James Brammer,
State Teachers College,
California, Pa.

The modern desk shown herewith is easily constructed and assembled because it is made almost entirly of ¾-in. lumber and entails only simple dado, mortise-and-tenon, and dowel joints. The fact that one side is drawerless not only adds to the appearance but to the ease of construction. The desk is very practical, and rests flush on the floor. Three


THUMBTACK HOLDING ARM AT VANISHING POINT
RECTANGULAR BLOCK DRAWN WITH THE PERSPECTIVE ARMS
THUMBTACK HOLDING ARM AT VANISHING POINT
20
PERSPECTIVE ARMS

A handy set of straight edges for making perspective drawings





Modern desk

drawers on the left provide ample drawer space, while the three shelves on the right can be used for books or as a place for potted plants. A shallow drawer above the knee hole provides space for writing materials.

Construction

The first step is to lay out the top which consists of a piece of ¾ by 23 by 46-in. stock. It may be made of one piece or in glued-up sections. A 12-in. radius cut on the left corner completes this simple top. The edges may be left square or cut with a shaper.

The next step consists of cutting three sides all 29¼ by 19 in., and one back 10 by 29¼ in. and another back, 9 by 29¼ in. Two of these 3 sides and the smaller back are joined together by drawer frames. Dowels are used to join the drawer frames, sides, and back. The remaining side and larger back are to be used to support the shelves. They are joined together by a dado joint and dowels. Both sides are attached to the top by a piece of angle iron, and screws are used to attach the two bottoms. The three shelves are 10½ by 19 in. and are fastened to the side by dowels and to the back by dado joints. The shelves are rounded with a 10½-in. radius.

The two sides of the desk are made firm by a drawer frame which supports the knee-hole drawer. Additional support is gained by the backboard which is doweled to the two inner sides.

The desk may be made out of either hard- or softwoods, and the finish will depend upon the wood used. Modern hardware can be bought at any hardware store.

A CENTURY OF PROGRESS

One hundred years ago this fall, on September 25, 1841, the University of Michigan opened its doors to its first freshman class in Ann Arbor. Earlier attempts at higher education in Michigan had included the ambitious Catholepistemiad, established in Detroit in 1817 by an act of the territorial legislature, and branches of the university in several cities of the state.

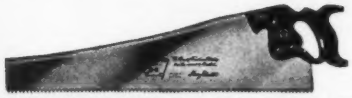
These earlier attempts were evidence of the strong belief in higher education of the early residents of Michigan. In 1837 the legislature created a board of regents of the University of Michigan with 20 members and laid plans for a new institution of higher learning. This board of regents included in its membership two physicians, four lawyers, a merchant, and a writer. Six of its members were members of the Michigan State Constitutional Convention; only seven had college degrees.

Rivalry for the location of the university was keen among cities of the state, but the regents chose Ann Arbor, perhaps because the Ann Arbor Land Co., donated a site — 40 acres of cleared land which still forms the central campus of the university. On this site stood the first buildings of the university, four professors' residences and a four-story main building known as Mason Hall in tribute to Gov. Steven T. Mason.

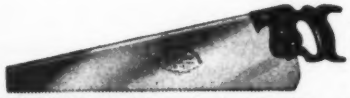
Seven students comprised the first class that met in 1841. Their two professors were the Rev. Joseph Whiting, professor of

(Continued on page 18A)

Disston Saws for Young Craftsmen



D-8 REGULAR PATTERN, Skew-back Hand Saw. 20, 22, 24 and 26 inches. Also made in Lightweight Pattern in 26", differs in width of blade only.



D-7 REGULAR PATTERN, Straight-back Hand Saw. 20, 22, 24 and 26 inches. Also made in Lightweight Pattern, length 26".

NO. 4 BACK SAW, the handiest of all saws for cutting mitres, grooves, tenons, mouldings and other shop work requiring accuracy. 8 to 16" inclusive.

NO. 10 COPING SAW, with frame of Disston Steel. Blades available for cutting wood, Bakelite, celluloid, bone, composition board, brass, copper and other metals.

NO. 2 COMPASS SAW, with open grip handle for easy control. Blade tempered to stand strain of curve-cutting. 10, 12, 14 and 16 inches.

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(Continued from page 410)

languages, and the Rev. George P. Williams, who taught mathematics which, together with Greek and Latin, made up the first curriculum of the university.

As the student body of the university grew, the curriculum of the department of literature, science, and the arts expanded. The department is now known as the College of Literature, Science, and the Arts. Many of the 13 schools and colleges that make up the modern university had their beginnings in this department.

Since this fall marks the 100th anniversary of the opening of the College of Literature, Science, and the Arts, the college will celebrate with a full day's program on October 15. This centennial celebration is planned to afford not only an opportunity for a discussion of the problems confronting a liberal-arts college during the coming years, but also an occasion for reviewing a century's achievements of the University of Michigan's first teaching unit.

The need of strengthening the secondary educational system of the state was recognized early. In 1870, the inspection of the high schools of the state was undertaken and, for the first time, the graduates of approved high schools were admitted without the entrance examinations which were then universally required. The college also began very early to give attention to the problem of the training of teachers and, in 1879, established the first chair of the science and the art of teaching in the United States.

Another step of great importance to education in the state of Michigan and of great influence on education everywhere was the adoption of coeducation in 1870. In the fall of 1870, 11 women students entered the literary department.

These achievements and other features of the development of the college will be discussed at the sessions of the centennial celebration.

PERSONAL NEWS

VAN WESTRIENEN APPOINTED TO STATE BOARD

Harold J. Van Westrienen, for 21 years connected with the vocational education department of the Hamtramck public schools, has been appointed supervisor of trade and industrial education for the Michigan State Board of Control for Vocational Education, of which George H. Fern is state director.

Harold J. Van Westrienen

Mr. Van Westrienen has a life certificate from Western Michigan College of Education, and a B.S. and M.S. from the University of Michigan in vocational education. He began his career as a teacher in Royal Oak, but one year later transferred to the Hamtramck schools where he has since remained. He has held the position of director of vocational education at Hamtramck for 15 years. During this time the department has grown from a one-teacher unit to include a staff of 15 regular and 15 defense teachers. Mr. Van Westrienen has had charge of the homemaking, commercial, and industrial-arts department, has been chairman of the department of instruction, designed the vocational building and drew the layouts for it, made the preliminary layouts and cabinet details for Copernicus Junior High School, and specific layouts for shops in all special departments.

Mr. Van Westrienen resided in Royal Oak where he was a member of the Royal Oak Board of Education for 10 years, three years as president; president of the Royal Oak Recreation Board; and is charter member and past president and secretary-treasurer of the Exchange Club. He has been a speaker at the A.V.A., M.E.A., and Western Arts Association, a member of the Detroit News-WWJ Green Lights program committee, and has contributed to the magazine INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, and *The Michigan Vocational Outlook*.

♦ M. M. PROFFITT, Educational Consultant and Specialist in Guidance and Industrial Education, Washington, D. C., was assigned by John W. Studebaker, U. S. Commissioner of Education, to work with officials of the U. S. Treasury to develop plans and materials which would help the schools to cooperate in the National Defense Savings Program.

♦ GEORGE P. HAMBRECHT, state director of vocational and adult education, called a con-

(Continued on page 20A)

INDUSTRY *uses these machines*

SCHOOL SHOPS *use these machines*

IN THE AVIATION INDUSTRY — batteries of Delta drill presses, saws, grinders and cut off machines are in constant operation in the plants of the Bendix Aviation, Consolidated Aircraft, North American Aviation, Glen Martin, Curtiss-Wright, Pratt & Whitney, Boeing, Lockheed, Douglas and other leading aircraft companies.

This is typical of the remarkable penetration of Delta machines in all branches of general industry as well as those plants engaged primarily in defense work. Even before the outbreak of the war, Delta machines were being rapidly installed in all types of plants—to help speed up production and reduce costs. With the inauguration of the general rearmament program—and the overwhelming demand for machine tools—the installation of Delta machines was greatly accelerated—until today the list of thousands of plants using Delta machines reads like the Blue Book of American Industry.

The many advantages that make these Delta machines so desirable for industry make them ideal for today's defense training program. For participation in the new Federal Defense Job Training program—or for carrying out the normal expansion of vocational training facilities—consider these basic advantages of Delta machines:

1. Low first cost—from 1/4 to 1/5 of old-type machines. This permits the proper equipping of school shops at greatly reduced budgets. Operation and maintenance costs are exceedingly low, too.

2. Portability and Compactness—Delta machines can be moved around to meet space requirements of school shops.

3. Complete Safety—No pains have been spared to make these the best guarded machines on the market.

4. Incorporate Latest Engineering Developments—Practically every worthwhile improvement in machines of this type has been developed and introduced by Delta engineers.

Every person associated with vocational training should get the full details of the story of this remarkable development in production methods—and its relation to industrial education.

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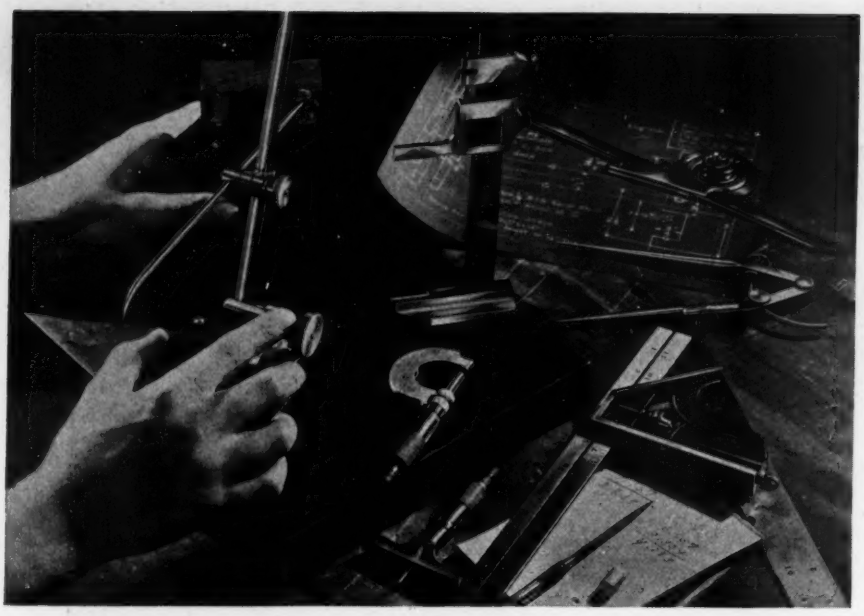

LOOK TO THE FUTURE

Perhaps sooner than you hope, the vast industrial machine which America is building will have finished its grim business and turned to more constructive ends. When that day comes, the young men now in your charge will find no lack of opportunity to apply the lessons which you are teaching them. The man who works with his hands, whose skill is heightened by the aid of fine tools, is destined to play a part of ever increasing importance. A knowledge of fine tools and how to use them is an invaluable asset and one that is always a source of genuine pride and satisfaction.

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STARRETT TOOLS

(Continued from page 18A)

ference at Madison, Wis., on September 29 and 30 which was attended by all local directors of Wisconsin schools of vocational and adult education. Three sessions were held at which the problems that arise in the administration of the National Defense Training Program were thoroughly discussed. Speakers on the various programs were: George P. Hambrecht, Harry Lippart, John Faville, Roy Shaw, George Nelson, R. L. Welch, H. C. Thayer, Dora M. Rude, J. E. Tepoorten, Mrs. Jennie Turner, Roy Fairbrother, C. L. Greiber, and Martin Wesolowski.

♦ HAROLD WILLIAM PORTER, who has taught for 12 years in the vocational school at Two Rivers, Wis., has been appointed supervisor of national defense training, working out of the office of the state department of vocational and adult education, Madison, Wis.

♦ THOMAS H. ALVORD, publisher of the *Livonia Gazette*, and a past president of the Western New York Newspaper Publishers' Assoc., has been appointed to the faculty of the department of publishing and printing at the Rochester Athenaeum and Mechanics Institute in Rochester, N. Y. He will teach newspaper administration, a new course covering all phases of weekly newspaper management; history of printing, and writing and publishing at the Rochester institution. The department of publishing and printing is sponsored by the New York State Publishers' Association.

Mr. Alvord is a graduate of Hamilton College and holds a master's degree from Columbia University.

♦ BYRON J. BROPHY, of Flandreau, S. Dak., has been appointed State Youth Administrator for the National Youth Administration of South Dakota. The appointment is effective October 16. Brophy will succeed Vernon J. Clarke, resigned.

♦ E. L. MEADER succeeds C. W. Popkins as assistant director of the Smith-Hughes evening and supplementary national defense training classes at Wichita, Kans. Mr. Meader has been machine-shop instructor at Central Intermediate School for a number of years, and he has instructed evening classes and assisted with the instructor training in the National Defense Program. He will be a very able assistant to J. C. Woodin, supervisor of vocational and industrial education. Mr. Popkins' duties in the East High vocational program have become too heavy; consequently, Mr. Meader will relieve him of part of his work.

♦ HAROLD RASMUSSEN, who for the past seven and one-half years was instructor in woodwork, drafting, and Smith-Hughes building trades at the Vermillion High School, Vermillion, S. Dak., has been appointed to fill the place made vacant by the resignation of Harold Porter in the wood trades and drafting department of the Two Rivers Vocational School at Two Rivers, Wis.

Harold Rasmussen holds a certificate of a four-year apprenticeship in carpentry issued to him by the Industrial Commission of Wisconsin. He also has a B.S. and an M.S. degree obtained at the Stout Institute, Menomonie, Wis.

♦ W. F. CURRIER has been named to succeed J. E. Moore as director of vocational and national defense training at Coffeyville, Kans. Mr. Currier spent several years at the building and millwork trades. He has held positions as industrial-arts instructor at Dodge City and Coffeyville. In his most recent job as supervisor of buildings and grounds at Coffeyville, he has had a very important part in planning and organizing the new trade school. Mr. Moore has taken a position as shop superintendent in a Wichita factory.

♦ HUPP E. OTTO, president of the National Graphic Arts Education Association, addressed the vocational and industrial-arts teachers of West Virginia at their 10-day conference held in August. The subject of his address was "Printing As a Trade School Subject."

♦ JOSEPH B. COYLE, Johnstown High School, Johnstown, Pa., was appointed national chairman of *Printing Education Week*. He succeeds Chester A. Lyle who had served as chairman since the inauguration of this activity by the National Graphic Arts Education Association.

♦ LIEUT. ROBERT KEITH, son of Floyd Keith of the Stout Institute, met his death on Friday, September 19, when his plane collided with another during maneuvers in the Louisiana area.

Robert Keith, who belonged to the Stout '42 class, enlisted in the U. S. Army Air Corps as a flying cadet in 1940. On April 25, 1941, he received his wings at Maxwell Field, Montgomery, Ala. His age was 21 years when the fatal accident overtook him.

♦ DR. ROBERT W. HAMBROOK, of Washington, D. C., senior specialist in industrial education, U. S. Office of Education, has just returned from a four-months assignment in England, studying educational procedures during war time.

♦ FRANK L. JUDISH, director, trade and industrial education, city public schools, High Point, N. C., received a master's degree in industrial education this summer from Iowa State College, Ames, Iowa.

♦ O. P. STAMSTAD, an industrial-arts instructor at Argentine High School, Kansas City, Kans., has been appointed assistant to L. E. Falgren, Supervisor of Vocational and Industrial Education. Mr. Stamstad will assist with the evening program.

♦ H. G. ROUNDS, an instructor in Ottawa High School, Ottawa, Kans., has been appointed by Supt. Marshall to succeed P. B. Allen as local director of the evening program. Mr. Allen has been employed by the Wichita schools.

♦ PERDUE B. GRAVES was selected by the Topeka board of education to succeed C. H. Hepworth as director of adult education at Topeka, Kans. Mr. Graves has been on the Topeka teaching staff since 1935 in which position he has been debate coach, instructor of public speaking, psychology, and evening courses. During the past summer he studied in the California Adult Education Workshop at Mills College, Oakland, Calif. Mr. Hepworth retired from his duties at the end of the past year.

(Continued on page 25A)

(Continued from page 20A)

♦ FRANK K. WELCH has been appointed State Youth Administrator for Maine.

♦ PAUL B. HARTMAN has been appointed state director for national defense in Ohio.

♦ BENJAMIN F. COMFORT, the founder of vocational education in Detroit, Mich., and principal of Cass Technical High School for many years, died at the age of 77, June 20, 1941, in Caledonia, Mo.

Mr. Comfort was born in Detroit in 1863. He was a graduate of the old Detroit high school in 1882. He taught Latin and mathematics in the Episcopal Academy of Michigan, and then left to study at Trinity College, Hartford, Conn. In 1887 he was appointed principal of Tappan School.

After holding this position for three years, he resigned to enter industry, but in 1898 he resumed teaching, this time in the Central High School of Detroit, Mich.

In 1906 he started Cass Technical High School on the third floor of the old Cass Union School, utilizing also a manual training shop in the basement. The enrollment then was 110 students.

Today, this school which started so humbly, has grown to be one of the finest schools of its type in the world.

ASSOCIATION NEWS

COMING CONVENTIONS

Iowa Vocational Association — November 6, at Des Moines, Iowa. Pres., L. H. Wood, director, vocational education, Sioux City, Iowa. Secy., H. W. Carmichael, board for vocational education, State House, Des Moines, Iowa.

Iowa Industrial Arts Association — November 6–8, at Des Moines, Iowa. Pres., E. H. Christensen, board of education office, Cedar Rapids, Iowa. Secy., Wm. D. Mayo, 1503 48th St., Des Moines, Iowa.

Wisconsin Industrial Arts Association — November 6–8, at Milwaukee Auditorium, Milwaukee, Wis. Pres., R. R. Bedker, Wauwatosa High School, Wauwatosa, Wis. Secy., Roy Van Duzee, West Allis Vocational and Adult Education School, West Allis, Wis.

Virginia Vocational Association — November 18–21, at Marshall Hotel, Richmond, Va. Pres., J. J. Fray, Rustburg, Va. Secy., Francis S. Chase, 401 N. 9th St., Richmond, Va.

Missouri Vocational Association — December 3–6, at Jefferson and Statler Hotel, St. Louis, Mo. Pres., Sherman Dickinson, 122 Waters Hall, Columbia, Mo. Secy., Miss Grace Riggs, Manual High and Training School, Kansas City, Mo.

American Vocational Association — December 10–13, at Statler Hotel, Boston, Mass. Pres., L. R. Humphreys, Utah State Agricultural College, Logan, Utah. Secy., Mr. L. H. Dennis, 1010 Vermont Ave., Washington, D. C.

End
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EQUIPMENT
Drawing Table
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Wood-Working Bench
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Arc Welding Bench
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You can handle larger classes... more efficiently ... without taking over space needed for other purposes ... by modernizing present vocational training classrooms with practical, space-saving Lyon Steel Equipment. Designed by engineers who know the practical requirements of both factory and school, Lyon Drawing Tables, Welding Benches, Woodworking Benches, Metal Working Benches, etc., provide work areas and storage facilities to accommodate a maximum number of students in a minimum of floor area. Mail coupon for catalog.
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City State

THE COMING A. V. A. CONVENTION

Consideration of problems that have developed in recent months through increasing demands for regular vocational and industrial-arts instruction in the schools of America, and the urgent need for looking to future development in these rapidly growing fields, will high light the 1941 Boston Convention of the American Vocational Association, December 10–13.

Closely associated with these objectives will be serious deliberation on problems attending the desired stabilization of education for work when the national defense emergency has passed and the country undertakes needed rehabilitation.

A third A. V. A. convention objective will be advancement of vocational defense training to all-out proportions, and advancement of all other national defense services that can be provided by the various divisions represented within the A. V. A. organization.

Based on the convention theme, "Vocational Education — National Defense — Economic Security," programs are being arranged by the A. V. A. vice-presidents for the presentation of national leaders in each field for discussion of timely training needs, methods, and techniques. The convention opens with a general session on Wednesday evening, December 10, in the ballroom of the Hotel Statler, convention headquarters. All sessions of the industrial-education and industrial-arts sections will be held in spacious quarters assigned in the Statler. The annual convention banquet and dance takes place Thursday evening, and the house of delegates meeting will be held prior to The Ship's program on Friday evening. Ralph Foss, of the McGraw-Hill Book Co., has been appointed deck officer for the Boston cruise of The Ship. The industrial-arts luncheon on Saturday will provide the convention climax.

Industrial Arts

Homer J. Smith, A. V. A. vice-president in charge of industrial-arts education, is planning the usual set of five special sessions to be held Thursday, Friday, and Saturday forenoons, Friday afternoon, and Saturday luncheon. Thursday afternoon is being left open to allow delegates to visit some of the outstanding schools and classes in Boston and vicinity. Cooperating with Professor Smith in preliminary work on the programs and in other ways, are the five members of the A. V. A. policies committee for industrial arts: O. B. Badger, Oregon; Earl L. Bedell, Michigan; Roy A. Hinderman, Colorado; Frank C. Moore, Ohio; and Verne L. Pickens, Missouri.

Edward C. Emerson, Boston, has been appointed chairman of the program committee. Willis B. Anthony, Fitchburg; Raymond W. Phipps, New Britain; Augustus F. Rose, Providence; and Richard M. Savage, Gorham; are some of the members who will assist him.

Industrial Education

An excellent preview of the trade and industrial section program for the Boston convention

(Continued on page 28A)

SHOP EQUIPMENT NEWS
New Products—Publications

NEW 16-IN. TURRET LATHE

A new 16-in. swing turret lathe designed for rapid production on chucking operations and bar work has been announced by the South Bend Lathe Works. This lathe has a 16¼-in. swing over the bed ways and saddle wings, 9⅝-in. swing over the tool-post saddle cross slide, 1⅜-in. hole through the headstock spindle, and 1-in. capacity through the collet.

New 16 in. turret lathe

The ram-type turret has both power feed and hand feed, with automatic indexing and individual stop for each of the six turret faces. A quick-change gear box provides 48 changes of turret power feeds, also 48 changes of both the cross and longitudinal feeds for the tool-post carriage and a series of 48 screw threads, 4 to 224 per in. Provision is made for changing the direction and speed of the turret feeds with relation to the carriage feeds. Twelve spindle speeds ranging from 10 to 731 r.p.m. are available. A two-speed motor permits quick change from high to low speed for reaming and tapping operations.

Complete information on this new turret lathe will be supplied on request by the South Bend Lathe Works, Dept. K7, South Bend, Ind.

THE PROTECTASAW GUARD FOR HAND SAWS

E. C. Atkins and Co., 402 S. Illinois St., Indianapolis, Ind., are marketing the new Protectasaw guard for hand saws. This guard is constructed from copperplated dead soft steel with a longitudinally arched body to prevent contact with teeth of saw.

The Protectasaw guard in use

When applied to saw, this guard touches the extreme front and rear points only, but protects all teeth when the saw is not in use.

It is held in place with a spring steel wire clip applied to the center of the saw. This clip is out of the way when the guard is not on the saw.

The Protectasaw guard can be filled with vaseline to prevent the rusting of a saw that is used infrequently.

This guard is made for 26-in. saws. For shorter saws, it can be cut to desired length with the tin snips.

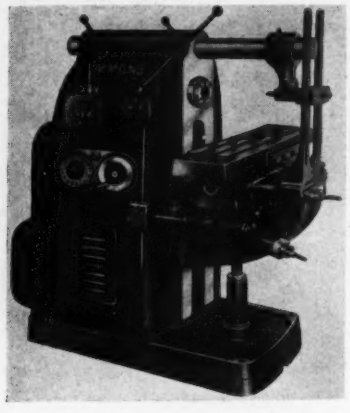
NEW MILLING MACHINE

The Simmons Machine Tool Corp., North Broadway, Albany, N. Y., have just placed their new model A-1, Selector Simmons Dial-Control Milling Machine on the market.

The over-all size of the table is 36 by 8⅛ in., with a working surface of 27 by 8⅛ in. The longitudinal power feed has a range of 34 in., and the vertical feed 18½ in.

The machine has a speed range of 56 to 170 r.p.m. in low gear, and from 210 to 630 r.p.m. in high gear.

There are 6 feeds which range from .013 in. per revolution to .074 in.



The model A-1 milling machine

The standard equipment includes a 2-h.p. a.c. motor with reversing magnetic push-button control, spindle clutch and brake, knockout rod, arbor support, overarm brace, and the usual crank handles and wrenches.

SHELDON LATHE TRIPLES PLANT CAPACITY

The Sheldon Machine Co., Inc., builders of Sheldon 10-, 11-, and 12-in. Precision Lathes, Arbor Presses, and Machine Vises, have moved into their modern new monitor-type daylight plant just completed at 4240-58 Knox Ave., Chicago. Located between the Milwaukee and

Sheldon's new plant

Northwestern railroads and completely equipped with modern machinery, tools, and plant equipment, this new plant has tripled Sheldon's lathe production.

Not a war plant, but built entirely on private capital as the permanent Sheldon home, this plant indicates confidence in a continued market for quality machine tools. Adjacent acreage to the plant has been secured for future expansion.

NEW CATALOG

A new and completely revised catalog containing 56 pages has been issued by the Walker-Turner Co., Inc., South Ave., Plainfield, N. J. It is profusely illustrated and explains in detail the standard line of metalworking and woodworking machine tools made by this company.

Also shown are a number of entirely new machine tools developed primarily for the defense industries. A unique radial drill press, two polishing lathes, and a radial machine for cutting ferrous and nonferrous metals, plastics, and ceramics are featured.

The other well-known machine tools manufactured by this company include metal-cutting band saws, radial saws, circular saws, jointers, lathes, and similar products.

A post card will bring a copy of this catalog to your desk.

NEW DESCRIPTIVE CATALOG

The Cincinnati Milling Machine and Cincinnati Grinders Inc., Cincinnati, Ohio, have recently issued their catalog No. M-995.

This booklet contains illustrations and brief descriptions, specifications, and the type of buying information needed to specify any of the current design machines put out by this firm.

A postal is all that is required to obtain this catalog.

CATALOG OF MAXITORQ CLUTCHES

The Carlyle Johnson Machine Co., Manchester, Conn., have just issued a bulletin describing their new Maxitorq floating-plate multiple-disk clutches. These are obtainable in single as well as in the double type.

They are made in four sizes, Nos. 22, 23, 24, and 25 with capacities ranging from ½ to 3 h.p. at 100 r.p.m., and they can be had with either wet or dry plates.

In this new design of multiple-disk clutch we have several features which are new to multiple-disk clutch construction; a unit which can be manually assembled or disassembled. Also a unit in which the plates are free running in neutral with a minimum of drag, abrasion, or heating, and a unit which can be manually adjusted with ease by simply lifting the locking spring.

NEW ARC-WELDING COST BOOKLET

Air Reduction, 60 East 42nd St., New York City, have recently published an 8-page booklet which enables the worker to quickly estimate the cost of arc-welding electrodes for welding any type of joint on any thickness with either bare or coated electrodes. This is made possible by using the new Airco "Electrode Consumption Calculator," which tells how many pounds of electrodes are required per linear foot of weld, and the consumption figures for both bare and shielded arc electrodes on all metal thicknesses commonly employed in making fillet welds, square-groove butt joints, V- and U-groove butt joints, bevel grooves and J grooves. The amount of steel deposited per linear foot of weld is also shown. As a further aid on other joints not shown, the basic formulas used in these calculations are included.

NEW WINGS FOR PRODUCTION

New facts on how leading aircraft plants are meeting their *tooling-up* crisis are revealed in an attractive new booklet, "New Wings for Production," just released by the Delta Mfg. Co., of Milwaukee. Numerous illustrations showing the actual air plant setups of such concerns as Bendix Aviation Corp., Consolidated Aircraft, Jacobs Aircraft Engine Co., and North American Aviation have been incorporated. In particular, this booklet emphasizes the clever adaptations of the new type low-cost precision machines—drill presses, cut-off machines, metal-cutting band saws and circular saws—to meet the urgent needs of the rapidly expanding aircraft industry.

Of unusual interest is the series of illustrations showing the special setups made at low cost with standard drill-press parts for use in airplane-engine production. It is noted that the equipment and setups illustrated and described in this booklet are also used in such plants as: Glen Martin, Curtiss-Wright, Pratt and Whitney, Boeing, Lockheed, Douglas, Beech, McDonald, Bell, Bellanca, Fairchild, Ryan, Waco, Sikorsky, Stinson, and Fleetwings.

FREE BOOK FOR SCHOOLS TELLS ALL ABOUT RUBBER

"The Romance of Rubber," a 46-page book on the history, manufacture, and every other phase of rubber is offered to schools for classroom use by the United States Rubber Co.,

(Continued on page 28A)

Making the Most of Metalcraft

KESTER Flux-Filled Solder Solves a School Shop Problem

• Kester Flux-Filled Solder — the right kind and amount of flux is self-contained in the alloy — is "made to order" for school shopwork.

It helps your boys, because it is easier to use, gets better, neater results. That's real encouragement in the interesting, important field of metalcraft.

It helps YOU, because it does away with separate fluxes. There's nothing to spill in working with Kester Flux Filled Solder — benches and floors don't suffer, nothing is wasted. Just cut a length from the spool, sufficient for each boy's work.

Kester Flux-Filled Solder is one of the basic materials of industry. Learning to use it is a fundamental of metalcraft; teaching its use reflects to the credit of the instructor.

Order Kester Flux-filled Solder from your wholesaler — or write direct to the address below.

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Eastern Plant: Newark, N. J.
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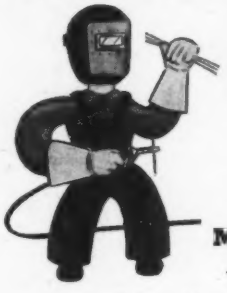
KESTER
FLUX-FILLED SOLDER

Teach A.C. ARC WELDING



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...the World's Best Selling
A.C. ARC WELDERS

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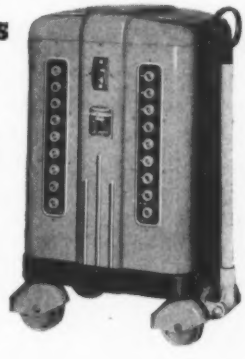
The quiet, efficient operation of the New Marquette A. C. Arc Welder provides the answer to your training problems. Shop classes are conducted with ease and safety, and you can use the best with economy. Marquette combines low initial cost with low operating cost.

CHECK THESE MARQUETTE FEATURES

- More power . . . low upkeep.
- Sturdily built . . . no moving parts to wear out.
- Improved, heavily insulated transformer gives a stable even arc at all heat stages.
- A tap for every heat, a heat stage for every job.
- Completely equipped . . . all necessary accessories.
- Nine models ranging from 125 to 350 amperes.
- Underwriter's Laboratories, Inc. Approved.



Free TO INSTRUCTORS

A complete set of job analysis sheets prepared by a former instructor in one of the nation's leading vocational schools is now available to instructors at no cost. Every conceivable weld job is analyzed thoroughly for training purposes. Send for them today. Address Marquette Manufacturing Company, 409 N. E. Johnson, Minneapolis, Minnesota.

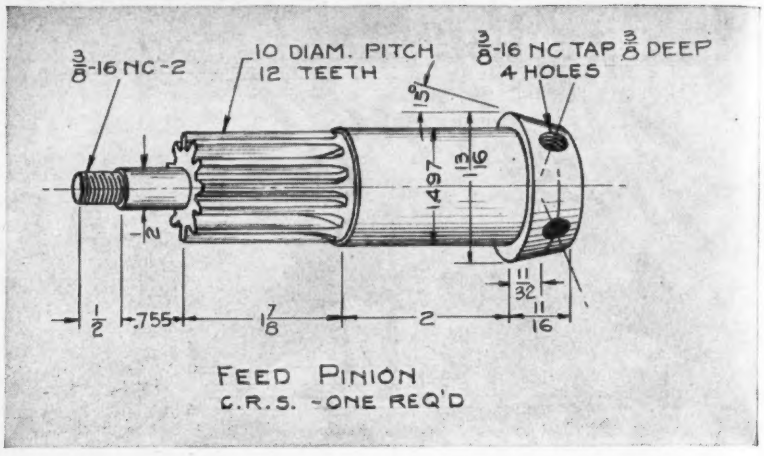
TEACH WITH THE BEST...USE MARQUETTE

MARQUETTE A.C. ARC WELDERS ARE APPROVED BY UNDERWRITERS' LABORATORIES, INC.
UL **MARQUETTE MANUFACTURING CO., INC**
MINNEAPOLIS, MINNESOTA

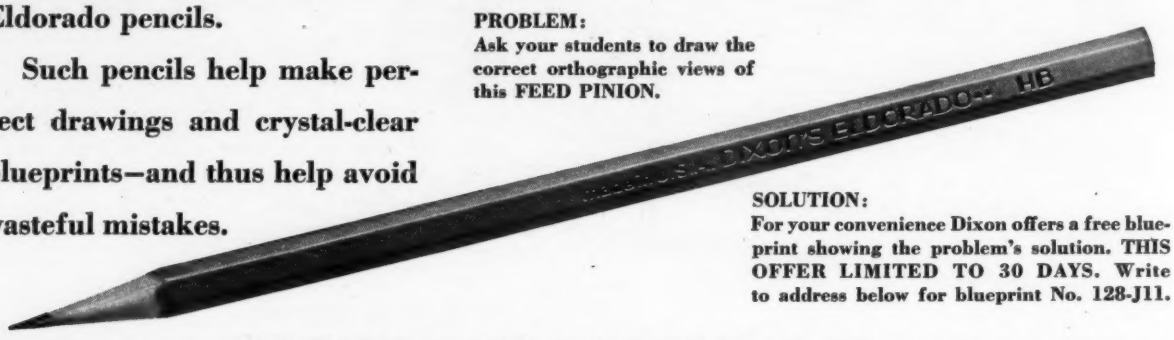
YOU... WHO ARE CHARGED...

with the first teaching of American designers of the future—will do best for them through specifying Dixon's *Typhonite* Eldorado pencils.

Such pencils help make perfect drawings and crystal-clear blueprints—and thus help avoid wasteful mistakes.



PROBLEM:
Ask your students to draw the correct orthographic views of this FEED PINION.



SOLUTION:
For your convenience Dixon offers a free blueprint showing the problem's solution. THIS OFFER LIMITED TO 30 DAYS. Write to address below for blueprint No. 128-J11.

SCHOOL BUREAU, JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

(Continued from page 26A)

Rockefeller Center, N. Y. A copy may be obtained, free, by any teacher who writes for it.

Written objectively, the book contains a large number of illustrations portraying modern rubber plantations, tire factories, and a vast number of industrial and household uses of rubber.

Other chapter headings include "Chemistry Makes Rubber Serve Us," "Preparing Dry and Liquid Rubber," "Rubber Serves the Sick," and "Rubber Helps Protect."

The cover illustration of the attractive book portrays Boro-Budur, one of the architectural marvels of the world. Built around A.D. 600, this great sculptured hill temple is located in Java, part of the Netherlands East Indies, where much of the rubber of the world is grown.

SOUND MOVIES IN COLOR FOR DEFENSE TRADE TRAINING

The first two of a series of 16mm. sound motion-picture films based on the book, "How to Run a Lathe," have just been released by the South Bend Lathe Works, South Bend, Ind. Produced in full color by Burton Holmes Films, Inc., these pictures represent the most advanced technique for teaching lathe operation in industrial and vocational schools, universities, army and navy training stations.

The first film entitled "The Metalworking Lathe," introduces the student to the standard back-geared screw-cutting lathe. It is ideally suited for showing to beginners. After seeing the film, the student may be allowed to manipulate the various lathe controls, as demonstrated in the picture. The film may then be shown again to answer the many questions that are bound to arise after a first experience with a lathe.

The second film, "Plain Turning," clearly illustrates all operations in the machining of a shaft held between the lathe centers. It teaches blueprint reading, measuring with calipers and micrometers, locating and drilling center holes, proper selection of cutting tools, rough turning and finish turning of the workpiece.

Both films are of the 16mm. size with sound track and each is approximately 800 ft. in length. Showing time of either is about 20 minutes. Complete information on securing the use of these films can be had by writing to South Bend Lathe Works, 425 East Madison Ave., South Bend, Ind.

ASSOCIATION NEWS

(Continued from page 25A)

is provided in the following announcement by John A. McCarthy, New Jersey State Director of Vocational Education, who is chairman of the program committee:

The trade and industrial program for the Boston convention is shaping into what promises to be an outstanding program which will attract the attention of employers, representatives of labor, and educators in all fields. The success of the program will be due to the earnest efforts made by the chairmen of the sectional meetings. These chairmen have been selected because of their leadership and their organizing ability.

Dr. Alonzo Grace, commissioner of education of Connecticut, is arranging a program that will give attention to the effects of social legislation upon the full-time long-term program of vocational education. Dr. Grace has secured as speakers H. I. Harriman, vice-president of the American Youth Commission, and Dr. Charles Prosser, of Dunwoodie Institute.

Dr. B. H. Van Oot, of Virginia, is preparing a program dealing with the NYA relationships in the vocational programs, and in the field of public service training attention will be given to the problems of extension courses for public employees. Albert H. Hall, of the New York State Board of Education, is chairman of one sectional meeting in this field, and the chairman of the sectional meeting, which will be devoted mainly to fire-department training, is to be announced later.

The training of women and girls will not be neglected because this is an important field in modern occupational life. Miss Clara H. Krauter, of the Essex County Girls' Vocational School, is arranging the program in this field.

During the past several years, new buildings have been erected for trade and industrial training, and many new buildings are being planned. Dr. Charles Bauder, of the Philadelphia board of education, is arranging a program that will give attention to buildings and equipment. Dr. Bauder has been successful in securing as speakers Miss Violett O'Reilly, of the L. E. Rabouin Vocational School, New Orleans; G. A. McGarvey, of the United States Office of Education; and Frank R. Robinson, of the Jules E. Mastbaum Vocational School. Mr. Robinson is to present some information about the development of the marine trades annex of the Mastbaum School.

An old friend in vocational education, E. K. Jenkins, now regional supervisor of the federal committee on apprentice training, is assuming the responsibility for speakers on apprenticeship problems. To date, "Jenks" has been successful in arranging for representatives of employers, organized labor, and apprentice supervisors to discuss problems in this field.

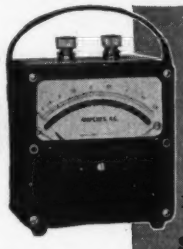
Bob Dolley, of Florida, is putting shape into the programs dealing with the diversified occupations. Dolley is a pioneer in this field, and he can be depended upon to prepare an attractive program.

John Beswick, of California, has been invited to prepare the program dealing with the training for national defense, and Mrs. Betty Hawley Donnelly, secretary of the New York board of education advisory committees, has been asked to prepare a program dealing with labor and industry's place in a full-time preparatory program.

Plans have been made for the meetings of the state supervisors of trade and industrial educa-

(Continued on page 37A)

FOR INSTRUCTION, TOO... *Industry's Test Instruments* COST LESS... BECAUSE OF THEIR LONG-LIFE DEPENDABILITY!



WESTON
MODEL 430
AC AND DC
INSTRUMENTS

Ideally suited for classroom instruction and student use because of their dependability, ruggedness and relatively low cost . . . features which have made the Model 430 line so universally preferred throughout industry. Have hand calibrated mirror scales of long length, with large scale openings. Accuracy within ½ of 1%. Sturdy Bakelite cases give added protection in service. Extremely compact. Available in complete line of AC and DC instruments.

RELAYS
Sensitive and Power Uses
Current and Voltage Types
SERVICE EQUIPMENT
Tubecheckers, Analyzers, Oscillators
Ohmmeters, Vacuum Tube Voltmeters
LIGHT MEASURING DEVICES
Illumination Meter, Foot Candle Meters
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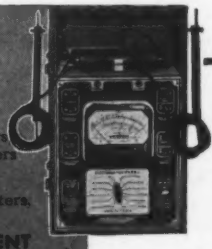
INSTRUMENT TRANSFORMERS
Portable and Switchboard – Potential and Current
PORTABLE INDICATING INSTRUMENTS
Ammeters, Voltmeters, Wattmeters, Galvanometers
Microammeters, Ohmmeters, Microfarad Meters
LABORATORY STANDARDS
Voltmeters, Ammeters, Wattmeters
STANDARD CELLS



WESTON
MODEL 772
MULTI-RANGE
MULTI-PURPOSE
CIRCUIT TESTER

One of many WESTON multi-purpose instruments for limited budgets; or for radio training. The Model 772 has 24 voltage, current, resistance and decibel ranges in one instrument. Has large, dependable WESTON 50 microampere meter. AC sensitivity 20,000 ohms per volt. Ohmmeter entirely battery operated. Broad measurements, and low cost, make it ideal for all preliminary checking . . . as well as for radio instruction.

WESTON ELECTRICAL INSTRUMENT CORPORATION
595 Frelinghuysen Avenue, Newark, N. J.

Is Your Electrical Instruction In Step With Defense Needs?

STANDARD Test and Distribution Panels Bring New Efficiency to Labs and Shops

● The Industrial Defense Program is calling for more and more technicians thoroughly trained in electrical practice. Is your school efficiently contributing to this much needed training?

Standard Test and Distribution is an important aid to electrical instruction, making it more effective and interesting. These units are low in cost, neat in appearance and provide maximum circuit and operating flexibility, as well as speed in connection changes. Ideal for all types of electrical problems, from elementary electricity to advanced adult work.

Models for all branches of electrical instruction — industrial arts shops, vocational and technical schools. Our experienced field engineers are at your service! Write Dept. W for complete details.

★ **THE STANDARD ELECTRIC TIME CO.** ★
Springfield, Mass. — Branch Offices In Principal Cities

Practice What You Preach!

▶ For a long time, you Instructors have been using our Visual Aids to get across to your students the importance of *Industrial* Coated Abrasives—Garnet and Metalite—instead of ordinary sandpaper and emery cloth.

▶ In some cases a second step may be necessary: encourage your local Board of Education to supply you with Garnet and Metalite so your students will have actual experience in *using* these technical, industrial tools.

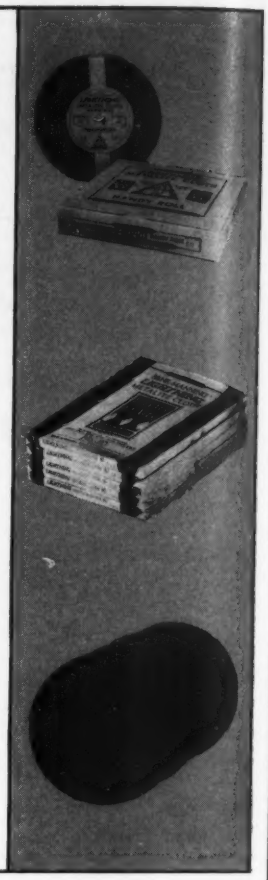
▶ From an Instructor friend, comes this thought-provoking letter:

"We use Behr-Manning Garnet and Metalite. What's the sense of teaching one's boys about Industrial Coated Abrasives if they have to use inferior flint and emery? We're preparing them by having them use the tools industry uses. Although the first cost is a little more, it's real economy in the long run."

▶ See what we mean? You've educated your students to Behr-Manning Garnet and Metalite. You owe it to them, to yourself and to your job to prove to your school authorities all the advantages of *using* Behr-Manning Garnet and Metalite in the wood and metal shops.

BEHR-MANNING, TROY, N. Y.
(DIVISION OF NORTON COMPANY)

Quality Abrasives Since 1872



NEW PUBLICATIONS

Spanish Colonial Furniture

By A. D. Williams. Cloth, 136 pages. 8 by 11 in., illustrated. Price, $3. Published by the Bruce Publishing Co., Milwaukee, Wis.

The author, who is an instructor in one of the U. S. Indian schools, has evidently fallen in love with the beauty and sturdy qualities of the old Spanish furniture still found in abundance in the territory now embraced by the states of Texas, Arizona, and New Mexico.

This high regard for this fine type of colonial furniture is clearly shown in the treatment accorded to each and every one of the 57 pieces described in his book.

Each piece of furniture is shown by a detail drawing and a halftone, and the description accompanying these also contains a full bill of material.

The book also contains a chapter on design and construction, and one on the proper method of finishing.

Carpentry and Joinery Work

By Nelson L. Burbank. Cloth, 8⅝ by 11 in. 286 pages, illustrated. Price, $3. Published by Simmons-Boardman Publishing Corp., New York, N. Y.

This is the third edition of this text. The author, who has had ample practical and teaching experience, has succeeded in writing a very complete book which contains much helpful material for the learner and apprentice, and also for the mechanic working at the trade.

Practical Shop Mathematics

By John H. Wolfe and Everett R. Phelps, Ph.D. Vol. I, cloth, 349 pages, 5⅛ by 8, illustrated. Vol. II, cloth, 318 pages, 5⅛ by 8, illustrated. Price of each, $2.20. Published by McGraw-Hill Book Co., New York, N. Y.

This is a revised edition of a mathematical text specially designed for students attending secondary schools. The material is divided into two volumes.

The first of these, fractions, describes the use of measuring instruments, and takes up algebra, geometry, and trigonometry and their application to machine-shop and toolroom work.

In the second volume, problems are introduced which involve compound angles and their application to practical problems involving screw threads, gears, indexing, and the like.

Our duty

Flight — Construction and Maintenance

By Capt. Bailey Wright, W. E. Dyer, Rex Martin, and others. Cloth, 6¼ by 9⅜ in., 283 pages. Price, $2.50. Illustrated. Published by American Technical Society, Chicago, Ill.

This book presents the basic principles of the airplane and its operation, so that the interested layman, and those who intend to enter the air-transport service in one of the numerous capacities offered by this field of transportation, may obtain a foundation upon which they can build by further study.

This book divides the subject into the following sections: blueprint reading, woods used in airplane construction, metallurgy, oxyacetylene welding, airplane construction, rigging the airplane, the repair of the airplane, the airplane propeller, quiz questions and answers, and index.

Jewelry and Enameling

By Greta Pack. Cloth, 5⅝ by 8¾ in. 377 pages, illustrated. Price, $2.50. Published by D. Van Nostrand Co., New York, N. Y.

This work, in which design and proper techniques are ever kept before the learner, is written in a terse explanatory manner, which tells the student what to do and does not tire or bore him.

The book is well illustrated, and its line drawings of built-up metal parts are direct invitations to try to make the brooches and other pieces of jewelry shown.

The book is divided into five chapters. In the first of these the student is at once inducted into an interesting problem. The other chapters

(Continued on page 32A)

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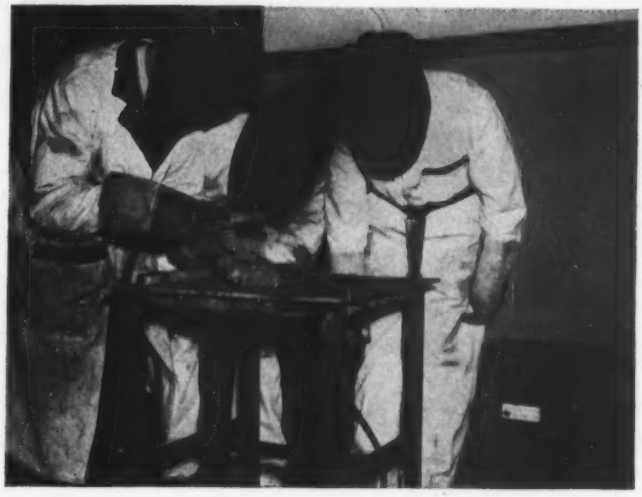

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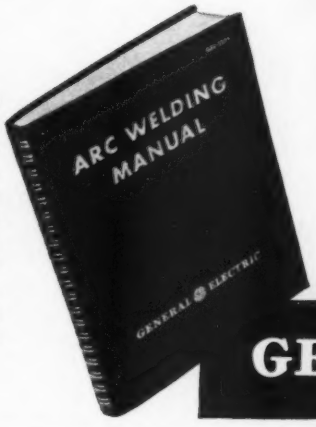

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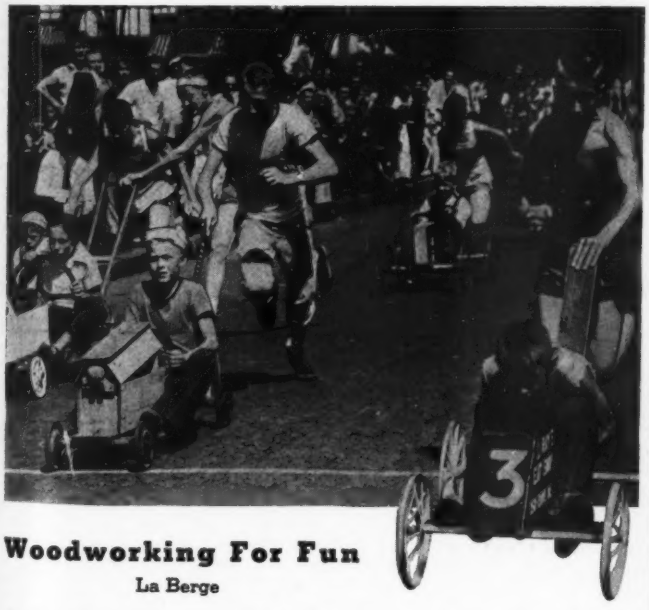

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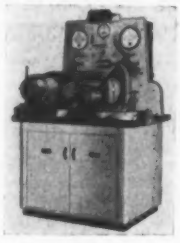

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BRADLEY
WASHFOUNTAINS

(Continued from page 30A)

describe the jewelry-making processes, decorative processes, jewelry making and stones used by the jewelry maker.

The appendix contains information on solders and fluxes, cleaning materials and solutions, preparation and care of tools and materials, the wire gauge, and a layout of a workshop.

Archery

By Natalie Reichart and Gilman Keasey. Cloth, 6⅛ by 9 in. 95 pages, illustrated. Price, $1.

This is the revised edition of a book which, while not specifically written to give students directions in making bows, arrows, bowstrings, and the like, gives excellent directions which may be very helpful to the one who is in charge of an archery class or club.

The book is divided into the following chapters: the relaxed method; archery equipment for target shooting; care of equipment; teaching an archery group or class; archery competition; indoor archery; glossary; and index.

Practical Mathematics

By Claude Irwin Palmer and Samuel Fletcher Bibb. Four 4⅞ by 7-in. volumes. Cloth. Price, $1.25 each. Part I, 186 pages on Arithmetic; Part II, 256 pages on Algebra; Part III, 206 pages on Geometry; Part IV, 209 pages on Trigonometry and Logarithms. Published by McGraw-Hill Book Co., New York, N. Y.

This well-known set of books on practical mathematics is appearing in its fourth edition. They have been thoroughly revised and new exercises have been added to bring the subject matter and data up to date.

The Aviation Mechanic

By Carl Norcross and James D. Quinn, Jr. Cloth, 563 pages. 6⅜ by 9¼, illustrated. Price: Textbook, $3; Trade Edition, $3.50. Published by McGraw-Hill Book Co., New York, N. Y.

Designed for students in training and mechanics who are working in airplane factories and airports, this book contains a rather complete exposition of all that should be known by the men who are producing and servicing the many types of airplanes which are now in use in this and foreign countries.

The book is divided into three parts. The first of these discusses the importance of the mechanic's work, describes the various types of modern airplanes now in use, and explains the theory of flight.

Part II describes the construction and production methods now in vogue in airplane factories.

Part III discusses aircraft servicing, maintenance, and repair both from the angle of commercial and military airplane use.

The Starrett Book for Student Machinists

Cloth, 184 pages, 4¾ by 7⅛. Price, 75 cents. Published by the L. S. Starrett Co., Athol, Mass.

This little booklet has had a reputation for years. An entirely new edition has now been published, bringing it up to date, and making it useful to the men who are now learning the machinists and toolmakers trade in order that they may do their bit in preparing this country for any eventuality that may arise during these troublesome times. The material in this book is divided under the following headings: How to Read Working Drawings, How to Make Measurements, Facts About Fits, Benchwork, Chipping and Filing Practice, How to Use Hack Saws, Drills and How to Use Them, Lathe Work, Screw Threads, Tapers, Toolmaking, Jigs and Fixtures, Grinding, Classifying Metals by Spark Testing, Locating and Aligning Machinery, Mensuration, Mechanics.

NEWS NOTES

♦ The Civil Service Commission has just announced an examination for information specialists in press and publications, and in radio. There are over one hundred jobs to be filled in the various government agencies. Salaries range from $2,600 to $4,600 a year. Eligibles on the employment list established last year as a result of the Information Specialist examination need not take this new examination unless they have acquired additional experience and wish to apply for a higher grade, as their names will be retained on the current register.

Persons with general experience in press and publications, or radio work are needed, as well as persons with publicity experience in such specialized fields as: foreign news reporting or editing, aeronautics, public health, conservation, economics, mining, agriculture, and engineering. To qualify for the press and publications option, applicants are required to have responsible professional experience in writing or editing for a large newspaper, national magazine, news or information service, or governmental agency. For the radio option, experience is required in educational or informational radio work, including the preparation of radio manuscript and the broadcasting of radio programs. For all the positions, applicants may substitute study in a residence educational institution above high school grade for part of the experience. No written test will be given, but applicants will be rated on their education, experience, and corroborative evidence. In connection with the radio option a voice test may be required of eligibles.

Applications must be on file with the Commission's Washington office not later than October 23, 1941. Further information about the examination and application forms may be obtained from the Commission's representative at any first- or second-class post office or from the central office in Washington, D. C.

♦ Motion pictures produced by the United States Steel Corp., and its subsidiary companies are proving to be of great value in training courses throughout the United States where thousands of workers are fitting themselves for national defense jobs. Each month more than 3000 men in classrooms, factories, and arsenals

(Continued on page 35A)

The leading books on

ARC WELDING

Used by hundreds of schools and colleges

"Procedure Handbook of Arc Welding Design and Practice." Authentic reference guide on all phases of arc welding. 1152 pages. 1557 illustrations. Price $1.50 postpaid in U. S. A.; $2.00 elsewhere.

"Lessons in Arc Welding." Complete and expert instruction in all phases of arc welding practice. 60 individual lessons. 184 pages. 170 illustrations. Price 50c postpaid in U. S. A.; 75c elsewhere.

"Simple Blueprint Reading." Provides simplified approach to easy mastery of blueprint reading. 138 pages. 100 illustrations. Price 50c postpaid in U. S. A.; 75c elsewhere.

"Arc Welding in Design, Manufacture and Construction." Includes 109 outstanding welding studies from the $200,000 Award Program of The James F. Lincoln Arc Welding Foundation. 1408 pages. 695 illustrations. Price $1.50 postpaid in U. S. A.; $2.00 elsewhere.

"Welding Metallurgy." Easy to understand. Authoritative. 359 pages. About 140 illustrations. Price $1.50 postpaid in U. S. A.; $2.00 elsewhere.

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(Continued from page 32A)

study the details of steelmaking through the medium of United States Steel films.

"The Making and Shaping of Steel," the latest film released, is most popular among educators participating in the national defense training effort. It tells the story of steelmaking in seven reels from the time the ore is mined until the finished product leaves the mills.

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208 South LaSalle St., Chicago, Ill.
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71 Broadway, New York, N. Y.
Birmingham Film Distribution Center
LeRoy Holt, sales promotion director,
Tennessee Coal, Iron & Railroad Co.,
Brown-Marx Bldg., Birmingham, Ala.
Cleveland Film Distribution Center
W. H. Cordes, manager, sales promotion — Advertising,
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, Ohio.
San Francisco Film Distribution Center
J. B. Du Prau, director, commercial office,
Columbia Steel Co.,
Russ Bldg., San Francisco, Calif.

♦ Roy Jones, president of the American Type Founders, Inc., and president of the National Printing Equipment Assn., calls attention to the fact that the all-out effort which the nation is today making in the matter of national defense has already had profound repercussions on the entire printing-equipment industry and will undoubtedly still further affect the ability of manufacturers engaged in this line to supply the printer with new machinery.

The printing equipment manufacturers of the country have been among the first to be called into defense production, and this already seriously affects the normal manufacturing capacity of our industry. By increase of working hours, additions to machine tool equipment, and in some instances additions to plant, the equipment industry has stepped up production so as to handle defense contracts and at the same time continue deliveries to regular customers. Now, however, productive capacity is of no avail because basic commodities are lacking.

This condition will not only affect the printing and lithographic trades, but also the printing instruction in schools, unless the Office of Production management will grant priority ratings which will make possible the production of new machinery and repair parts sufficient to keep the present status of instructional and plant capacity of the graphic arts in operation.

♦ The Jam Handy Organization, 2821 E. Grand Blvd., Detroit, Mich., announces 10 new educational films designed to speed benchwork training in defense training classes, high schools, and technical and vocational schools.

This new visual aid to benchwork instruction is produced in a slide film Kit-set. By showing each progressive step in fundamental benchwork operations, the films enable the student to see and practice each step until he becomes proficient.

Starting with the tools used in fundamental benchwork projects, the first film shows the proper use and care of hand and power saws, layout tools, and measuring instruments. The remaining films cover drills and drilling; reaming, tapping, and threading; finishing rough castings; scraping; rivets and riveting; and layout work.

The slide films are of the reading or lecture type, allowing the instructor to use them at the speed best suited for his class. They can be shown to large or small groups.

♦ East Texas State Teachers College, Commerce, Tex., reports that the 1941 summer session was very successful. In the August exercises, 96 students received their master's degree, and 323 had the bachelor's degree conferred upon them.

♦ Consumers Union of U. S., Inc., 17 Union Square, New York City, will present suggestions in their various issues, on how the Consumer Class Plans may be utilized in English, social studies, health, science, and home economics.

♦ A streamlined course in teaching, designed to inform supervisors, foremen, and group leaders at the RCA Mfg. Co., Camden, N. J., how to instruct workers on defense materials, was inaugurated recently. The session, which lasted for two hours, was attended by 80 men. Four additional two-hour study periods will be held to complete the course. Other classes will go into action later until a total of 350 men will have been given this training.

♦ The Chilocco Indian School, Chilocco, Okla., has added a new building to house a printing department. Located in the new quarters is a pressroom, two linotype rooms, bindery, office, and classroom.

♦ The Division of Simplified Practice, National Bureau of Standards, announces that printed copies of Simplified Practice Recommendation R179-41 Structural Insulating Board (Vegetable Fiber), are now available.

These recommendations cover sizes and thicknesses, colors, finishes, and the treatment of edges for the various structural insulating board products.

Copies of R179-41 may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents each.

♦ The Carborundum Co., Niagara Falls, N. Y., will formally open its exhibit at the Chicago

(Continued on page 37A)

THE MARKET PLACE

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Made of Specially Rolled Copper Bearing Rust-Resisting Steel Channel sections having a solid center Rib and Solid Sand Flanges at Top and Bottom.

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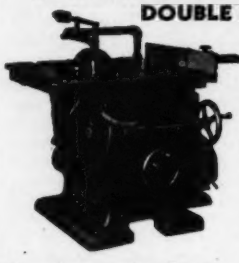

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Slugs—1 1/4"-1"-3/8"-3/16"—dia. (in any thickness)
Pewter Solder—70/30—12 ga. round
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In most cases this will pay the freight.
30 DAY TERMS ON SCHOOL ORDERS.
Hanna Hardwood & Plywood Co.
TULSA, OKLAHOMA

(Continued from page 35A)

Museum of Science and Industry, on October 16, 1941.

♦ Northwestern University recently bought a lightning-making unit consisting of a 1,500,000-volt-surge generator and a 500,000 volt-ampere, 60-cycle high-voltage test set. This will be built and installed into the new Technological Institute at Evanston, Ill., by the Westinghouse Electric and Mfg. Co.

♦ Western Pine Assn., 510 Yeon Bldg., Portland, Ore., have just issued detail sheets DS-4, illustrating a built-in bar of knotty pine; P9-5, which shows a bunk bedroom; P9-6, which describes a pine-paneled staircase; and DS-3, a modern welsh dresser.

♦ Fellowships and scholarships totaling $10,000 have been awarded to 23 men and women for advanced study in safety education for the 1941–42 academic year by the national Center for Safety Education at New York University, it was announced yesterday by Harold O. Voorhis, secretary of the university.

The awards were made from a $40,000 grant of the National Conservation Bureau, accident-prevention division of the Association of Casualty and Surety Executives, which supports the work of the Center, now entering its fourth year.

♦ The Future Craftsmen of America Handbook, published by the Mu Sigma Pi Fraternity of Wayne University, Detroit, Mich., has had such a remarkable sale that the first edition has been sold out. A second edition, revised and enlarged, is now ready. Because of the material that has been added, and because of increased printer's costs, the price of the new book is $1.

♦ LEONARD WAHLSTROM, who recently retired from active teaching at the Francis W. Parker School, Chicago, presented his extensive collection of books, pamphlets, reports, photographs, and clippings dealing with industrial arts and vocational education to Bradley Institute.

In doing this, Mr. Wahlstrom is following the example of Mr. Chas. A. Bennett who several years ago donated his extensive library to the same institute.

Albert F. Siepert, dean of education at Bradley, states that with such donations as these, the school is rapidly building up a collection of material dealing with the history of industrial arts and vocational education that may rank as one of the best in the country.

♦ Descriptive material on the technique of seam and spot welding is given in a 4-page leaflet, No. 18–333, issued by the Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa. Address Dept. 7–N–20.

Factors affecting pressure, current, and timing are discussed with special emphasis on time of current flow. Synchronous and nonsynchronous control applications are treated with recommendations for the proper use of each system.

Specifications for aluminum and brass welding are given, also tables listing data on seam and spot welding of mild pickled and oiled steel.

♦ Four young people under 25 years of age have been appointed by President Roosevelt to membership on the National Advisory Committee of the National Youth Administration, it was announced by NYA Administrator, Williams.

The following are appointees: Miss Esther Ekblad of Salina, Kans., who will represent the interests of farm youth; Carroll M. Leevy, Columbia, S. C., who will represent Negro youth; Miss Louise Morley of New York City, representing student youth; and James R. Herrington, Jr., an NYA project worker at College Park, Ga., who is to be spokesman for NYA youth.

ASSOCIATION NEWS

(Continued from page 28A)

tion and state supervisors of industrial teacher training, preceding the opening of the A. V. A. convention. Arthur B. Wrigley and Dr. Theodore Struck, the presidents of these groups, are busily engaged in preparing the program. The city supervisors will carry out their usual luncheon and breakfast conferences.

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We don't want to be alarmists but the plain facts are these:

The Government has placed defense priorities on many items—such as metals, tools and chemicals—many of which are used in Art, Industrial Art and Vocational Courses. Many of these items are no longer obtainable, others are advancing in price almost daily.

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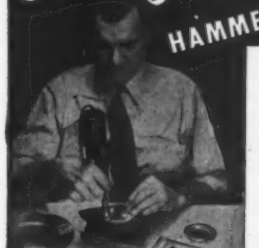

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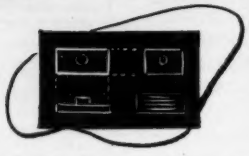

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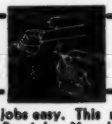

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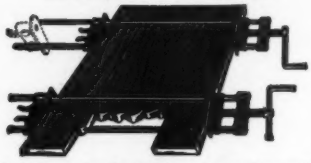

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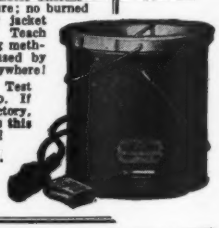

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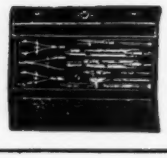

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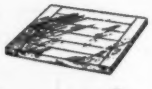

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